An Investigation of Online Maritime English Education in China

by

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Statement of co-authorship

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Located in chapter 2

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Abstract

English is the official working language for oceangoing seafarers across the world. In China, substantial time and effort has been dedicated to improving maritime students' Maritime English. However, when maritime graduates are employed as seafarers, many of them still regard a lack of English ability as the main obstacle to effective communication on board. Low English proficiency has become one of the main barriers for Chinese seafarers to compete in the international maritime labour market. Given the language challenges faced by Chinese seafarers, it is imperative to develop strategies to improve the outcomes of Maritime English education in China. When online technology has demonstrated its potential to improve the quality of education, it has also introduced great opportunities for Maritime English education in China.

This study aims to identify ways to improve the outcomes of Maritime English education in China through online methods, making maritime students more adaptable to the practical language needs of their profession. To achieve the research aim, a mixed methods approach was employed in which questionnaires were administered and interviews were conducted. Data were collected on the current status of, needs and readiness for, online Maritime English education in China from the perspectives of maritime students and Maritime English teachers.

In total, 255 maritime students and 34 Maritime English teachers from different maritime education and training institutions in China participated in this research. The selection of the participants was based on purposive and stratified random sampling. The statistical data were analysed using SPSS (Statistical Package for the Social Sciences) software Version 23. The data collected from the interviews were analysed using the qualitative data software NVivo Version 11. Quantitative statistical tests, such as descriptive analysis, Exploratory Factor Analysis (EFA), Structural Equation Modelling (SEM), Kruskal-Wallis test, Mann-Whitney U Test, and Spearman's Rho test, were employed to analyse the quantitative data. Thematic analysis and three-step coding were adopted for the qualitative data analysis.

The research made a number of findings. For example, the current status of online Maritime English education in China was still in its early stages. Very limited and simple online methods were being used in practical Maritime English teaching and learning. Also, the study found that there was a strong need for online Maritime English education; however, the exam-oriented teaching mode greatly impeded the implementation of creative online methods.

In addition, the levels of maritime students' self-efficacy and self-management of online learning were relatively low. Some Maritime English teachers had a low level of technical competence. To successfully carry out online Maritime English education in China, considerations for individual preferences should be highlighted. The result of this research shows that a blended learning approach was recommended. Recommendations for blended learning were provided from five aspects of Maritime English education in China: Maritime English online learning materials, Maritime English assessment and feedback, online interactions, related online support and Maritime English teachers.

It is suggested that future research into Maritime English in China should focus on operationalising the blended Maritime English learning mode recommended in this research. Some outstanding issues found in this research, such as enhancing online interactions in English and optimising online Maritime English tests, are worthy of more detailed exploration. Furthermore, a longitudinal study would be beneficial to observe the effect of the recommendations made in this study.

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Chapter 1 Introduction

1.1 Introduction

This research investigates online Maritime English education in China through the perspectives of maritime students and Maritime English teachers. The first chapter presents an overview of the research. It begins by presenting the research background of this study, which includes an overview of online learning and an overview of English and Maritime English education in China. The research aim and objectives are then identified, followed by research justification and significance. An overview of the research methodology and the thesis structure are also provided.

1.2 Research background

1.2.1 An overview of online learning

Information and communication technology (ICT) has been developing at an unprecedented speed for several decades. With the rapid evolution of technology, the computer is no longer the only means of accessing the internet. Many other digital devices, such as mobile phones, iPads, and interactive whiteboards, have integrated online functions. Accompanied by this trend, in 2017, the number of global internet users reached 3,578 million (Statista, 2018), and China's internet population climbed to more than 772 million (Borak, 2018).

ICT not only includes a broad range of communication devices, but also encompasses various services and applications. It has made inroads into educational contexts and has facilitated knowledge acquisition with new paradigms and approaches (de la Campa Portela & Bocanegra-Valle, 2007). Correspondingly, online learning and its associated research have gained increasing attention in the field of education. Instead of being a peripheral or supplementary part of education, online learning has become an indispensable part of the learning process in the new century (Bozkurt et al., 2015).

In line with this trend, the pedagogical circle of language education is remarkably shaped by the progress of online technology, expanding research trajectories and introducing tremendous new opportunities and paradigms (Kaplan & Haenlein, 2016; Virtanen, Haavisto, Liikanen, & Kääriäinen, 2018). Internet-based learning and teaching methods are of great significance in modern education and all kinds of online education courses are now thriving

at full pace. As a result, a myriad of online education platforms (e.g., wikis, massive open online courses [MOOC]), applications (e.g., podcasts, iTunes), and communities (e.g., blogs) have become available, making anywhere-anytime-education possible (Kattoua, Al-Lozi, & Alrowwad, 2016; Means, Toyama, Murphy, Bakia, & Jones, 2009; Virtanen et al., 2018).

There are obvious reasons for the rapid development of online education worldwide. Firstly, online programs have the potential to make education accessible to the public (Goodman, Melkers, & Pallais, 2017; Peters, 2003). Abundant educational resources and both synchronous and asynchronous communication can be offered online to learners geographically separated from instructors, especially to those who do not have the option to attend traditional classrooms (Kaplan & Haenlein, 2016). Secondly, online education provides new forms and possibilities, which can be complementary to traditional teaching and learning (Kentnor, 2015). The flexibility of online instruction gives learners more autonomy and convenience, enabling them to develop their own ideas independently with more self-confidence (de la Campa Portela & Bocanegra-Valle, 2007; Johnson et al., 2016; Kattoua et al., 2016). Accompanied by enhanced flexibility, universities can also increase their enrolments since students are offered more choices of courses they may want to attend (Kentnor, 2015; Seaman, Allen, & Seaman, 2018; Tallent-Runnels et al., 2006). Thirdly, the shortage of educated labour force within the worldwide labour market can be addressed by online education that is capable of satisfying the various needs of diverse students (Wan & Jiang, 2014).

From the paragraphs above, it can be seen that the continuous evolvement of internet technology has provided tremendous opportunities for education. There is significantly extensible space in practice to improve online learning and teaching experience, especially in higher education contexts (Bozkurt et al., 2015). Thus, this research is being conducted to explore potential online methods to improve the quality of Maritime English education in China.

1.2.2 An overview of English and Maritime English education in China

English education in China has seen a continuous explosion in demand since China's Reform and Opening-up policy in 1978 (Cortazzi & Jin, 1996). On a national level, the Chinese government regards English as an indispensable bridge linking China to the rest of the world (Silver, Hu, & Iino, 2002). On an individual level, a large number of Chinese students are

inclined to spend much time and energy studying English to seize potential employment opportunities after graduation with the prestige attached to gaining high English proficiency (Cortazzi & Jin, 1996). English has become one of the core subjects within a school curriculum (Hu, 2013). Consequently, numerous Chinese English language learners spend a large amount of time and money on various English courses, programs or activities. However, due to the teaching mode which focuses on doing exercises and checking answers (Tang & Wang, 2014) and centralised curriculum aiming to help students pass English exams (Rao, 2013), many students have not developed necessary competence in English (Cortazzi & Jin, 1996; Xia, 2014). The existing English language education seems to fail to meet the requirements of both society and individuals (Hu & McGrath, 2011).

Maritime English education, as a branch of English language education which aims to ensure all seafarers worldwide can effectively communicate with each other, experiences the same hurdles. Despite the fact that a number of Maritime English classes and many methods are put in place to improve students' English proficiency, many Chinese seafarers still regard English deficiency as the major obstacle to effective communication on board (Kang, Xiao, Zhou, Bai, & Yang, 2013; Tang, Llangco, & Zhao, 2016).

In practice, shipping is a highly globalised industry (Almklov & Lamvik, 2018; Kahveci, Lane, & Sampson, 2002). As such, Maritime English proficiency is essential for multicultural and multilingual crews to ensure a safe and secure working environment (Progoulaki & Roe, 2011). Since 1995, English has been recognised as an official working language by the International Maritime Organisation (IMO). The Manila Amendments highlighted the accountability of companies for ensuring their seafarers' effective oral communication in English at all times on board (IMO, 2010a).

In such a globalised working environment, communication failure is still considered as one of the major factors responsible for maritime accidents (Park, 2017; Ziarati, 2006), including seafarers' deficiency in English (Ahmmed, 2018; Apostol-Mates & Barbu, 2015; Ziarati, Ziarati, & Çalbaş, 2009). Ineffective communication in such a multicultural environment may exert a negative emotional impact on seafarers, such as depression, loneliness, and isolation, leading to low work efficiency or even emotional problems (Kang et al., 2013). Research shows that Chinese maritime students and Chinese seafarers are still low in Maritime English proficiency (Fan, 2017; Fu, 2008). The quality of Maritime English education in China does not meet the expectations of Maritime English teachers and seafarers' employers (Fan, Fei,

Schriever, & Fan, 2017a; Wang, Yan, & Chen, 2017). Due to this language barrier, China still finds it hard to increase the employment rate of Chinese seafarers in the global maritime labour market (Tang et al., 2016), although there has been an 813% increase in the number of Chinese maritime students from 2001 to 2010 (Fan, Fei, Schriever, & Fan, 2015a).

The above facts show that a gap remains between the outcomes of Maritime English education and the practical needs of the seafarers (Fan et al., 2015a). On account of the language challenges faced by the Chinese seafarers, it is imperative to develop strategies to improve the outcomes of Maritime English education in China. Although many methods and strategies can be used to improve the quality of education, the fast development of ICT provides new possibilities to eliminate the gap between classroom teaching and real-life needs. Up till now many studies have found that online learning could have positive impact on learning English for specific purposes (ESP) (Alkhezzi, 2016; Sevilla-Pavón, Serra-Cámara, & Gimeno-Sanz, 2012; Simonova, 2016; Sokolova, Golovacheva, & Chernaya, 2015; Tsai, 2011; Yang, 2013, 2015), but few online courses or strategies have been applied to Maritime English education in China. Cole and Trenkner (2012) point out that although using online methods is appropriate to improve students' Maritime English ability, online learning has developed much slower in Maritime English education in China than it has in the field of general English. Furthermore, most of the current students are living in a world inseparable from the internet and digital devices (Wet, 2013). To enhance the learning outcomes of Maritime English education, the learning and teaching mode needs to be adjusted to meet the learning habit of these students. A further investigation shows that there is a dearth of research on the exploration of the feasibility of online Maritime English education in China. Therefore, this research endeavours to fill the gap between the thriving online learning and its relatively meagre practice within Maritime English education in China.

1.3 Research aim and objectives

While online education is not new within English language education, it is relatively new within Maritime English education. Furthermore, there is limited empirical research related to online Maritime English education in China (Fan, Fei, Schriever, & Fan, 2015b). This study intends to make some contributions to this field. The major aim of this study is to identify ways to improve the outcomes of Maritime English education in China through the integration of online methods, making maritime students more adaptable to the practical needs of their profession. To attain this aim, an investigation regarding online Maritime

English education in China was carried out in order to examine Chinese maritime students' and Maritime English teachers' perspectives towards the various aspects of this issue. The research also tries to provide recommendations on how online methods can be used to facilitate Maritime English learning in China.

A mixed methods research approach was employed to achieve the research aim and objectives because a combination of quantitative and qualitative research approaches can draw on the strengths of both, while minimising their disadvantages (Bryman, 2006; Johnson & Turner, 2002) and can make the results more holistic and convincing (Saunders, Lewis, & Thornhill, 2011). Semi-structured interviews and questionnaires enabled the researcher to examine the views of maritime students and Maritime English teachers towards online Maritime English education in China. The process of re-visiting the research objectives during the study assisted the researcher in ensuring the research design and implementation were geared towards achieving the pre-defined research objectives. Based on the aim of this research, four research objectives are presented in the following paragraphs to provide a clear framework for this research.

Research objective 1: To investigate the current status of online Maritime English education in China. This objective is to examine how various online methods are currently integrated in Maritime English education in China. Its aim is to identify key issues, such as the current teaching mode of Maritime English education in China, assessment and feedback, teaching materials, learners' interactions, the availability and usability of online technology, and the support of online Maritime English education.

Research objective 2: To examine maritime students' and Maritime English teachers' needs in regard to online Maritime English education in China. The aim of this research objective is to identify the extent to which maritime students and Maritime English teachers are in need of online Maritime English education. The degrees of needs are approached from two aspects: the subjective needs and objective needs. The objective needs, such as the requirements of Maritime English and the outcomes of Maritime English education in China, are covered in the literature review. In terms of subjective needs, the research is designed to investigate students' and teachers' expectations of assessment, feedback, learning materials, learning interactions within online Maritime English education, their preferences of online technologies and their needs for relevant support.

Research objective 3: To examine maritime students' and Maritime English teachers' readiness in regard to online Maritime English education in China. As for readiness for Maritime English education, this research mainly discusses students' and teachers' readiness to participate in online education, such as their self-efficacy and self-management of online Maritime English education, and other factors that influence readiness, such as technology and support.

Research objective 4: To provide suitable recommendations for online Maritime English education in China. This research objective is to provide recommendations for Chinese maritime education and training (MET) institutions in order to improve Maritime English education. It focuses on exploring the ways in which Maritime English education can be enhanced by online technologies to better meet the language requirements for future Chinese seafarers. Knowledge of such recommendations is derived from the literature review and the findings of this research.

In line with these research objectives, the following research questions are proposed:

1) What is the current status of online Maritime English education in China?

2) To what extent are maritime students and Maritime English teachers in need of online Maritime English education?

3) To what extent are maritime students and Maritime English teachers ready for online Maritime English education?

4) What are the recommendations for implementing online Maritime English education in China?

1.4 Justification and significance

One of the justifications of this research is based on the existing gap between the increased practical Maritime English requirements and the unsatisfactory outcomes of current Maritime English education in China (Fan et al., 2015a). With the development of the shipping industry, the increased multicultural and multilingual onboard working environment makes communication more complicated for the oceangoing seafarers. Communication failure is still one of the dominant reasons that lead to maritime accidents nowadays, in spite of the development of technology applied on vessels and the introduction of relevant international

regulations (Ahmmed, 2018; Apostol-Mates & Barbu, 2015, 2016a; Ziarati et al., 2009). A survey showed that about one-third of crew members of 17 different nationalities had experienced misunderstandings caused by their inadequate English proficiency (Schriever, 2009). An investigation found that 83.3% of the surveyed pilots reported having experienced miscommunications (Gruenefeld et al., 2018). Apostol-Mates and Barbu (2015) conclude that even if a lack of English proficiency is not among the first causes of maritime accidents, it is an outstanding secondary cause, or it contributes to aggravating circumstances. These research results indicate that further improvements are needed in Maritime English education.

In response to this situation, effective communication is for the first time incorporated into the mandatory Part A of the Manila Amendments of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers Code 2010 (STCW 2010) (Fan et al., 2015a). This modification shows that the requirement for seafarers' Maritime English proficiency is higher than ever before.

Another justification is that the fast development of ICT has made inroads into online Maritime English education and training. Online methods can provide new ways to realise these specific purposes and eliminate the gap between classroom teaching and real-life needs. Maritime English teaching that utilises online approaches could be appropriate for contemporary Maritime English education based on the following features. First, no uniform teaching method can meet the needs of maritime students who are greatly varied in English proficiency levels and educational backgrounds (Navarro, Garbin, Agena, & Garcia, 2015). Second, the technical nature and multidiscipline coverage of Maritime English makes it difficult to fulfill the teaching goal of Maritime English in a traditional classroom (Mentz, 2009). Third, the Maritime English learning and teaching mode needs to be adjusted to meet the learning habits of current students, most of whom are so-called millennials (Wet, 2013). These millennials have some notable characteristics, such as having short attention spans, being skilled in technology and being prone to multitasking and multiliteracies (Cope & Kalantzis, 2009; Majid et al., 2016; Myers & Sadaghiani, 2010), which profoundly influence their learning styles and preferences. For example, their short attention spans highlight the need for more learning attractions and rewards (Swanzen, 2018). They have the impressive ability to process many tasks at the same time, but they lack the ability of critical thinking and introspection (Nicholas, 2008). They would like to learn through varying levels of technological integration (Keengwe & David, 2013). Their multiliteracies can be enhanced

through the integration of technology (Chitty, 2012). Correspondingly, teachers should try to create a learning environment that can meet their specific needs whilst still delivering necessary content.

This study provides insights into the probability and the feasibility of the integration of online approaches into Maritime English education in China with an aim to realise the specific purposes of Maritime English education. This study offers empirical evidence on current status, needs, and readiness as to online Maritime English education in China and provides recommendations for online Maritime English education in China. By providing alternative solutions to improve the Maritime English proficiency of Chinese maritime students, this study can contribute to the enhancement of the competitiveness of future Chinese seafarers in the global maritime labour market and the construction of a safe shipping environment.

1.5 Overview of methodology

The combination of qualitative and quantitative research methods can support broad data collection and provide deep insights into the participants' opinions (Johnson, Onwuegbuzie, & Turner, 2007). In this research, a mixed methods approach was considered to be appropriate and effective in addressing the research objectives, because it offered a potentially comprehensive and deep understanding of the perceptions towards online Maritime English education from different participants' perspectives (Creswell, 2013b).

The non-experimental study was conducted in some maritime education and training (MET) institutions in China to obtain data on online Maritime English education. The target population of this research was current maritime students and Maritime English teachers from various MET institutions in China. Purposive random sampling (Teddlie & Yu, 2007) and stratified random sampling (Nickolas, 2015) were utilised for quantitative and qualitative data collections respectively.

In this study, research instruments included both questionnaires and semi-structured interviews to generate results (Harris & Brown, 2010). The questionnaires and interviews were designed in alignment with the research objectives as well as the findings of the literature review. The questionnaires were designed to collect quantitative data (Leung, 2001) which focused on maritime students and Maritime English teachers' perceptions towards the issues of online Maritime English education. The quantitative data were mainly collected

online through 5-point-Likert-scale questionnaires and analysed by IBM SPSS (Statistical Package for the Social Sciences) Version 23. The semi-structured interviews were conducted to glean qualitative information, which aimed to gain a deeper insight into the participants' attitudes and individual understandings (Gill, Stewart, Treasure, & Chadwick, 2008). Qualitative data were gained through face-to-face, internet or telephone interviews. Based on thematic analysis and three-step coding, the qualitative data were analysed using the software NVivo Version 11. A detailed exploration of methodology is discussed in Chapter 3.

1.6 Thesis structure

In order to achieve the research aim and objectives set above, this thesis presents seven structured chapters: Introduction, Literature Review, Methodology, Quantitative Data Analysis, Qualitative Data Analysis, Discussion and Recommendation, and Conclusion. These chapters present a detailed exploration of this research. Apart from this first chapter, which was already summarised in section 1.1, the contents of the other chapters are outlined below.

Chapter 2 reviews available literature in relation to this research. The literature review is comprised of three main parts: online learning, ESP learning and Maritime English education. The first section identifies the definitions of online learning which frames the scope of this research. The barriers to implementing online learning are discussed in this section. Then the review details justifications for the adapted Quality Matters (QM) Rubric Standards and several influential readiness frameworks that have been identified and used in past studies. In the online ESP learning section, it covers the background knowledge of ESP, including the main characteristics of ESP and needs analysis. This section discusses the implications of learning theories for ESP and online learning and then explores the technology applied in ESP learning. The third part of the literature review primarily examines issues related to the current requirements of Maritime English, the outcomes of Maritime English education in China and related studies on online Maritime English education.

Chapter 3 presents and justifies the methodology employed in this research. It describes and justifies the mixed methods design. This is followed by an in-depth description of the research design and data collection procedures. Then data analysis techniques are presented. Finally, ethical considerations and the reliability and validity of the research are discussed.

Chapter 4 analyses the data collected from the questionnaires and reports the findings of the quantitative study. The quantitative data are analysed using IBM SPSS software (Version 23). A descriptive data analysis is employed as the first step in order to provide preliminary information on respondents' views. The underlying structure of observed variables and the internal reliability of the measuring instrument are verified with Exploratory Factor Analysis (EFA). Structural Equation Modelling (SEM) is used to examine the interrelationships among multilevel variables. After that, a Kruskal-Wallis test is used to find the influential factors to the responses of dependent variables. A Mann-Whitney U test is conducted to determine which groups were statistically different from each other. Finally, a Spearman's Rank Order Correlation (rho) is used to calculate the strength of the relationship between the participants' responses.

Chapter 5 presents the analysis of the data collected from the interviews and reports the findings of the qualitative study. An overview of the findings of qualitative data is also presented. Then the data is analysed in five themes emerging from the preliminary analysis. Thematic analysis and three-step coding are adopted for this research. NVivo (Version 11) is adopted for the purpose of data analysis.

Chapter 6 discusses the findings of quantitative and qualitative data analyses with reference to relevant theories, policies, and practices in literature. Recommendations for improving Maritime English proficiency of maritime students are then made based on the discussions in line with the research objectives and research questions.

Chapter 7 draws conclusions from this research. It revisits the research objectives and research questions as well as the key findings presented in the Discussion and Recommendation chapter. Furthermore, it discusses the research limitations and implications for further research. It concludes with a summary of the results.

1.7 Summary

This chapter has provided a general overview of the research. Following a brief introduction, this chapter has looked at recent changes in the field of education against a background of the rapid development of ICT. It has described the situation of English and Maritime English education in China. The chapter has provided a statement of its research aim and objectives with research questions guiding the study. Based on the research aim and objectives, it has

outlined the research methodology employed in this study, which included both quantitative and qualitative research. Regarding the research context, this chapter then has provided a general description of the justification and significance of this research. Lastly, the structure of the whole thesis with a brief idea of each chapter has been outlined at the end of this chapter.

The next chapter provides a range of pertinent literature regarding theories and discussions that relate to online learning, ESP learning, and Maritime English education. The literature first examines the definitions, barriers, status, and trends of online learning. The Quality Matters (QM) Rubric Standards and several readiness frameworks are introduced with a discussion of their adaptions to this study. Following that, relevant academic findings, theories, and practices on ESP learning are covered with an emphasis on online learning. Finally, the literature explores the various aspects of Maritime English education, including the domain, requirements, outcomes of Maritime English education in China and related studies conducted in online Maritime English education both in China and other countries.

Chapter 2 Literature Review

2.1 Introduction

The literature review of this research examines the previous studies in relation to this research and highlights the key theoretical frameworks to support the current study. In this chapter, studies on online learning, ESP (English for specific purposes) learning, and Maritime English education are reviewed. To be specific, definitions of online learning related terms are discussed in-depth. Following this, barriers to the implementation of online learning are explored from organizational, personal and technical perspectives. Then, the QM Rubric Standards and the frameworks of readiness for online learning are reviewed. ESP learning is first examined with regards to its characteristics and needs analysis. Theories in relation to language learning, including behaviourism, cognitivism, and constructivism are covered to lay a theoretical foundation for the research. In addition, previous studies that investigated the integration of ICT and ESP learning are reviewed. Finally, issues and challenges within the domain of Maritime English education are discussed to provide a better understanding of the current status and requirements of Maritime English education in China.

2.2 Online learning

2.2.1 Terminology related to online learning

Due to the numerous research conducted in online learning, many terms associated with this area appear in a large number of academic papers, such as e-learning, online learning, internet-assisted learning, mobile learning, digital learning, web-based learning, network-based learning, tele-learning, technology-enhanced learning, virtual learning, computer-assisted learning, computer-based learning, distributed learning and distance learning. Although their definitions can be found through various resources like academic papers and glossaries, the definitions of these terms in most cases focus on the individuals without a holistic analysis. There is little literature analysing these definitions systematically. Some definitions overlap or have similar meanings to each other (Fan, 2011). Therefore, if they are not clarified, newcomers in this area may be confused about the differences among these terms and when these terms are used interchangeably. This part examines the terminologies used in the field of online learning so that the researchers can have a clear scope of these terms and find relevant literature that may have used different academic terms.

Online learning is now becoming a very broad area that comprises a variety of terms. These terms arise at the confluence of technological and pedagogical development (Ally, 2008). Therefore, the online-learning-related terms are analysed from technological and pedagogical perspectives respectively in this chapter. The former category focuses on the terms with a technological feature, such as e-learning, online learning, distance learning, virtual learning and web-based learning. The latter category analyses the terms that stress their pedagogical traits, such as blended learning, fully online learning, and active learning.

2.2.1.1 Terms with a technological focus

Despite the fact that there are many technology-related terms that appear in the online learning area, it is noticeable that these terms are made up of two or three parts. The first part relates to either the major technologies used in the learning, such as online, computer, electronic and the internet; or the characteristics related to the major technologies applied in the learning process, such as distance, virtual and tele-. Some terms have a middle part that connects the first part and the last part. Normally, the words used in the middle part show the role of the technologies applied in the learning process, such as assisted, enhanced, based, facilitated and mediated, are used in the middle part. Sometimes, the second part is omitted in some terms. The last part is usually formed by a word related to the pedagogical forms (Anohina, 2005), such as learning, teaching, education, training, tutoring, and instruction.

There are some discrepancies among the different words used in the second or the third part of the terms, but in practical use, it is the first part which is related to technologies, that determines the scope and feature of each term (Anohina, 2005). In this section, the focus is put on the first part of the terms, that is, the technology-related terms are primarily examined through an online technological stance. Specifically, the terms are discussed either through the major technologies applied in the learning, such as electronic, online, network, the web, computer and mobile learning, or through the major technological features appear in the learning, such as distance and virtual learning. As for the second part of the terms, the words are chosen according to the common usages. With regard to the third part, the authors of this research choose “learning” as the word for this part because the application of online technologies shifts the centre of the class from teachers to students (Weegar & Pacis, 2012). Some frameworks or standards for online learning place much emphasis on students’ needs, such as the Quality Matters Rubric Standards (Collis & Moonen, 2008), the E-quality Framework (Masoumi & Lindström, 2012), and the e-Learning Maturity Model (Marshall &

Mitchell, 2007). The word “learning” emphasises learners’ activities in the learning process (Halversen & Tran, 2016). Therefore, it is the proper word that can embody the characteristics and influence of online technology. One exception of the word used in the third part is “computer-mediated communication (CMC)” for the reason that CMC is now a relatively fixed academic term. It is used far more frequently than “computer-mediated learning”. To test this idea, the author of this research searched “computer-mediated communication” in Google on August 14, 2018, and found about 1,120,000 results, whereas the search for “computer-mediated learning” only found about 40,000 results. For this reason, the term CMC is chosen for analysis in this research.

The following part of this section tries to analyse and compare the frequently used technology-related online learning terms to identify the scope and features of them, such as e-learning, online learning, web-based learning, internet-based learning, network-based learning, computer-mediated communication (CMC), computer-assisted learning (CAL), mobile-assisted learning (MAL), distance learning and virtual learning.

a) E-learning

Literature shows that a delineation of e-learning is drawn on the perception towards the instrumental characteristics of this term. For example, Zhang, Zhao, Zhou, and Nunamaker (2004) maintain that unlike confined traditional learning, e-learning refers to the technology-based learning processes delivered electronically to the remote learners through a computer network. Ellis, Ginns, and Piggott (2009) define e-learning as an educational process facilitated by ICT to assist in the students’ learning process. In some definitions, the scope of e-learning is extended by adding the asynchronous feature. For instance, Lee and Lee (2006) believe that e-learning is an instructional delivery to the target learners by using the internet techniques, be it synchronous or asynchronous.

Although technological characteristics are prominent in the above definitions, there are divergences as to the kind of technologies that should be focused on. As shown in the above definitions, the electronic devices, the internet and ICT are the technological media of e-learning. As such, e-learning comprises a variety of digital programs, components and delivery approaches (Selwyn, 2011).

However, Tavangarian, Leypold, Nölting, Röser, and Voigt (2004) believe that technology or electronic media alone is insufficient to define e-learning, because, from the perspective of

constructivism, learning is a generative process that should be constructed by the learner independently. Based on this theory, e-learning is a procedural construction of knowledge with regard to individual experience via information and communication systems, whether they are networked or not (Tavangarian et al., 2004). From this perspective, e-learning is an aggregation of multiple learning forms with the support of electronic devices (Tavangarian et al., 2004). In other words, it involves electronic devices or the internet as an integrated part of the learning process instead of treating them as a supportive role.

b) Online learning

The scope of online learning definitions varies greatly due to the diversity of the practice and different understandings of online technology (Ally, 2008; Anohina, 2005). The following part lists some representative definitions of online learning. Watson (2005) defines online learning as a kind of education that is delivered mainly through the internet. This definition implies this term does not include those educational forms without a significant internet element. Carliner (2004) regards online learning as the education in which learning activities and supportive resources are presented via a computer. From this definition, computers, or more generally speaking electronic devices, regardless of them being connected to the internet or not, play a key role in online learning. Some definitions combine the two types of definitions and thus form a definition with a narrower scope. Peters (2015) maintains that online learning is using the internet-connected computers to obtain educational information. In such definitions, the connection to the network or the internet through a computer or other electronic device becomes a necessary component of online learning.

Despite such diversities in the definitions, most definitions of online learning put the focus on the importance of connections, be it with a computer or not (Anohina, 2005). Online learning can be any form of educational activity carried out via the connection to the internet (Beek, 2011). Apart from the definitions with a focus on technology, another kind of definition investigates online learning from a different perspective. Ally (2008) believes that online learning is more than using the internet as a medium although the internet is an important component of it. In the process of online learning, the internet exerts vital functions, such as accessing learning materials, interacting with others, and obtaining support. As such, the learning process and learners' contribution should be considered in online learning (Ally, 2008).

c) Web-based learning, internet-based learning and network-based learning

In some articles, web-based learning is a synonym of online learning (Dringus & Cohen, 2005; iNACOL, 2011; Mbuva, 2014; Moore, Dickson-Deane, & Galyen, 2011). But web-based learning emphases "using the web as the medium" (Khan, 1997, p. 5), while online learning comprises a wide spectrum of technologies. In this way, web-based learning can be regarded as a branch of online learning. Similar to web-based learning, internet-based learning, and network-based learning can also be viewed as a subfield of online learning because internet-based learning focuses on the use of the internet (Anohina, 2005) whereas network-based learning stresses the use of the networks for educational purposes (Kern, Ware, & Warschauer, 2008). In network-based learning, the network is an integrated part or a medium of the learning process that encourages students to get abundant learning resources (Harasim, 2000). The same principle applies to internet-based learning.

d) Computer-mediated communication (CMC)

Santoro (1995) describes CMC as the application of computer systems and networks through which information can be transferred, stored or searched. Another delineation of CMC was drawn recently. In this definition, CMC is a kind of communication among separated people, which is implemented synchronously or asynchronously through computers (Musa, Mohamed, Mufti, Latiff, & Amin, 2015). From the two definitions of CMC within a time span of 20 years, the connotation of CMC definitions has not changed much. CMC comprises not only the pedagogical application of online technologies but also the various human interaction in different contexts (Salaberry, 2013). The development of the internet exerts a profound impact on the implementation and performance of CMC (Hrastinski & Keller, 2007).

e) Computer-assisted learning (CAL)

CAL refers to any instructional activity in any context with computer technologies (Fan, 2011; Le & Fan, 2010). It is the pedagogical application of CMC. Originally, CAL refers to a wide range of applications of the computer such as tests, tutorials, games, drills, and simulations, whereas network-based learning on the other hand specifically indicates the pedagogical use of computers connected to either local or international networks (Kern et al., 2008). Given the present radical convergence of digital devices and the internet, the dividing lines between CAL and network-based learning are increasingly blurring (Kern et al., 2008).

f) Mobile-assisted learning (MAL)

MAL can be regarded as an educational provision formally or informally dominated by handheld devices (Traxler, 2005). Whilst, in the past, the scope of MAL was concentrated on the application of mobile technology and mobile devices, more recent opinion has shifted the emphasis to learning mobility (Sharples, 2006). Guided by this idea, mobile devices can include any instrument that is portable, autonomous and convenient to perform educational activities anytime (Trifonova, Knapp, Ronchetti, & Gamper, 2004). As such, MAL is not limited to mobile phones as many portable devices would fall into this category, such as audio-CDs, portable radios, DVD players, and audio-cassettes (Kukulska-Hulme & Shield, 2008).

g) Distance learning

Distance learning refers to a kind of learning process where learning groups, instructors, and learning resources are geographically separated from each other (iNACOL, 2011). Although the term does not specify what technologies are applied in the delivery of learning, communicative technologies are normally required in distance learning as the principal means of communication (Moore & Kearsley, 2011). With an emphasis on physical separation, openness, flexibility and support for learners (Lamy, 2013), distance learning can be viewed as a branch of online learning on account of its increasing dependence on online technologies (Bozkurt et al., 2015; Deniz, Kesan, & İzgiol, 2013; Hiltz & Turoff, 2005). Without the internet or the network, the interactively synchronous or asynchronous communication in distance learning cannot exist (White, 2006).

h) Virtual learning

Generally, the definitions of virtual learning put emphasis on the technologies involved in the learning. For instance, virtual learning is a type of education in which computer software, the internet or both are used to deliver instructions to students (Beek, 2011); virtual learning is commonly referred to as a learning process mediated by computers and digital technology (Weiss, 2006). In some scholars' views, it is synonymous with online learning (iNACOL, 2011). But virtual learning usually takes place in a synchronous learning environment and highlights the visual effects (Günes & Franzén, 2008).

From the above definitions and analyses, despite some discrepancies among these terms (Lamy, 2013), the connection to either the internet or the network is one of their common characteristics. In line with this trend, the rapid development of online technologies is blurring the boundaries of many terms. For this reason, some of these terms are interchangeably used in practice (Ally, 2008; Fan, 2011; iNACOL, 2011; Mbuva, 2014; Moore et al., 2011; Zhang et al., 2004). In practical use, these terms are generally referred to as the applications of online technologies for educational purposes (Meskill & Quah, 2013). In this way, the term "online learning" was chosen as the umbrella term for other terms. Figure 2.1 embodies the relationships among the abovementioned terms. Based on the previous analysis and comparison, three focused areas can be identified in the field of online learning, i.e., device focused, internet/network focused and mobility focused. Figure 2.1 shows that although different terms have different focuses, every term is, to some extent, internet or network focused.

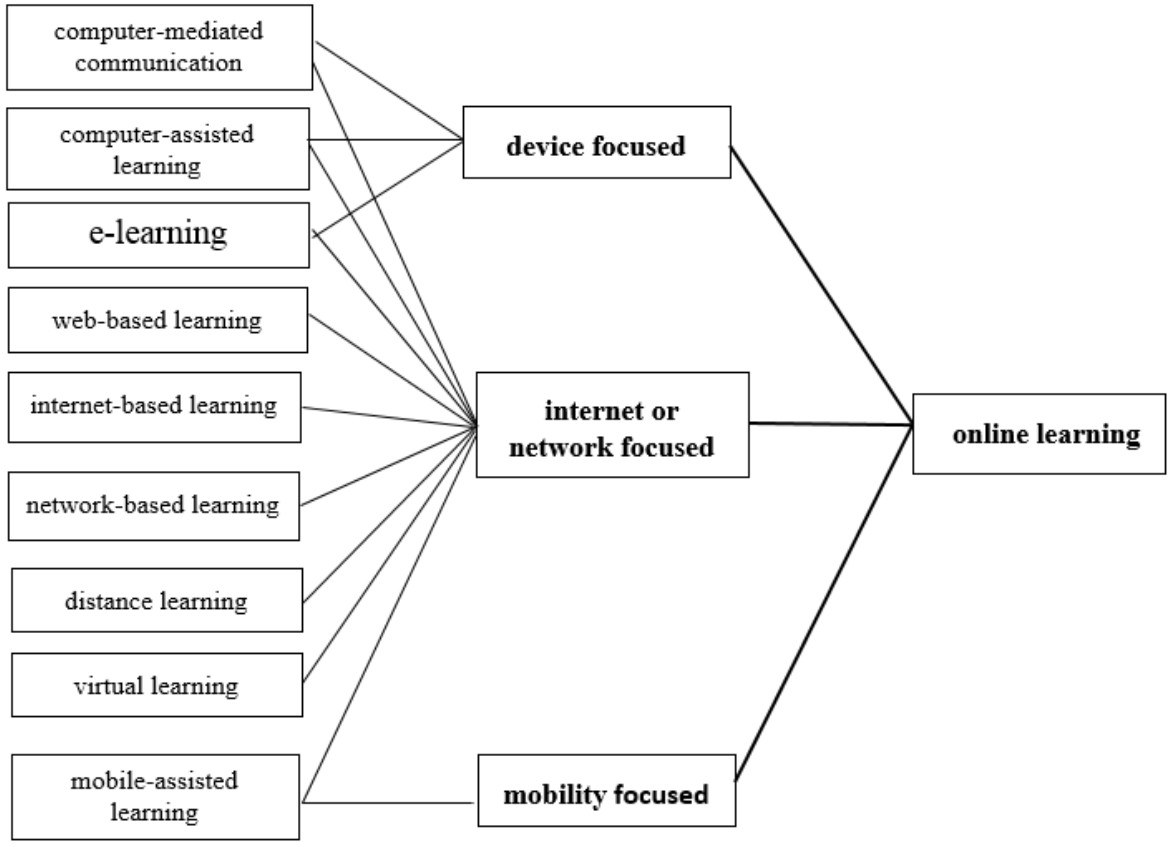

Figure 2. 1. The relationships among the terms with a technological feature

2.2.1.2 Terms with a pedagogical focus

The terms related to online learning can be categorised into groups by using different pedagogical criteria. Based on the configurations of online delivery, online learning can be divided into the fully online learning mode, mixed learning mode and adjunct learning mode (Harasim, 2000). Mixed learning mode is also called blended learning or hybrid learning. The following part of this thesis uses the term "blended learning" to name this type of online learning because it is used much more frequently than the other two according to the search results made by Google on August 14, 2018.

Fully online learning treats the network or the internet as a major medium for the entire course of learning (Harasim, 2000). Literature shows that the major problems in fully online learning include the lack of interaction between learners and instructors, the difficulties related to self-regulation (Bernard & Rubalcava, 2000) and the indistinct role of online instructional materials (Sun, 2014). Sun (2014) investigates the difficulties of this type of learning from learners' perspectives through an inductive method. Six major difficulties are identified in her study: (1) studying on a regular basis and following the plan; (2) fixing a time suitable for all the classmates to work together; (3) working in collaboration; (4) keeping constant engagement during the learning process; (5) being self-motivated and self-directed; and (6) being socialised (Sun, 2014). Generally, fully online learning is more suitable for those self-disciplinary students with a stronger self-learning ability.

Blended learning is an educational mode that combines both face-to-face and online learning methods and experiences (Hockly, 2015). Blended learning is the field that represents a major part of online learning studies (Sun, 2014). The major challenge of blended learning is the identification of the optimum integration of online technology into traditional methods (Garrison & Kanuka, 2004). However, Lamy (2013) maintains that a mere mixture of technologies is not enough to identify blended learning because conventional teaching can also be complemented by network-based activities. The virtual interactive ability (Swan, 2001) and the community facilitating capability (Garrison & Kanuka, 2004) contribute much to the effectiveness of blended learning. Some research shows that blended learning has the potential to be more effective to enhance the learning outcomes than the face-to-face approach (Garrison & Kanuka, 2004; Hockly, 2015) and fully online learning (Rovai & Jordan, 2004). A survey on learners' perspectives on online learning showed that the majority

of students believed that they could benefit most from a mixed approach of online and face-to-face learning (Dahlstrom, Brooks, & Bichsel, 2014).

Adjunct learning regards the network-based utilities as an auxiliary tool to improve the teaching quality in a traditional class rather than an inseparable component of the learning process (Harasim, 2000). Adjunct learning originates from e-mail and computer conferencing and aims at the expansion of class discussion (Quinn, Mehan, Levin, & Black, 1983). It integrates all levels of educational activities, such as distributing instructional materials, assignments, administering tests or quizzes, and providing feedback (Harasim, 2000). The main feature that distinguishes blended learning from adjunct learning is the extent to which online technologies are embedded in the learning process. In blended learning, online activities constitute an indivisible part of the instruction and form a component of students' learning achievements, whereas the online devices in adjunct learning are used as a means to facilitate regular teaching (DeNeui & Dodge, 2006; Harasim, 2000).

In terms of learning experiences, online learning can be categorized into expository learning, active learning and interactive learning (Means et al., 2009). Expository learning is a mode where digital devices are used to transmit expository content, such as definitions and equations, to students. This is a relatively passive learning mode in that students are expected to receive and reproduce the content being taught (Swaak, De Jong, & Van Joolingen, 2004). In contrast, active learning requires learners to explore knowledge or address problems through inquiry-based manipulation of digital devices (Means et al., 2009). Students' involvement and participation are the kernels of active learning (Prince, 2004). Students in higher education generally hold a very positive view of active learning (Lea, Stephenson, & Troy, 2003) due to their increased self-learning capability. Unlike the aforesaid two learning modes, interactive learning emphasises that knowledge is gained through inquiry-based collaborative interaction with other learners. In this mode, the teacher plays a role as a co-learner and a facilitator whereas technology is a medium for interactions (Means et al., 2009).

Based on the above discussions in this section, it can be concluded that the degree of integration of online delivery increases in the order of adjunct learning, blended learning, and fully online learning. Similarly, the degree of learners' participation increases in the order of expository learning, interactive learning, and active learning. Online learning could be different in varied circumstances. It is hard to say which online learning mode is the best. Taking into account the different levels of online learning, this research will try to find the

appropriate online learning mode to increase Maritime students' involvement and participation in Maritime English learning.

2.2.2 Barriers to implementing online learning

The success of online learning implementation depends on multiple factors and complex procedures (Khan, 2005). Overall, the barriers to the implementation of online learning can be classified into organizational, personal and technical categories.

At the organisational level, higher education is generally slow in undertaking the corresponding reforms (Nash, 2015). It is a complex procedure for educational institutions to integrate innovative technology (Tsai, Shen, & Chiang, 2013) because they have to consider the factors like learning outcomes, faculty satisfaction, student satisfaction, availability of online facilities, and cost efficiencies (Graham, 2013). In addition, online learning raises some ethical issues, such as participants' privacy in virtual world, copyright and intellectual property (Kern et al., 2008), and potential threats (Aslani, Mohammad, Mohammad, & Ebrahim, 2013). Neglecting such issues may cause trouble in online learning in the future. Therefore, some educational institutions would avoid implementing online learning because it takes much time and effort to deal with such issues.

The management of online learning needs to be qualified with certain standards. Nash (2015) stated that to get a maximum profit gain, some institutions prefer to offer short online courses with slack discipline. For example, some online courses assess students without proctored exams (Hollister & Berenson, 2009). Such a trend in online learning leads to another problem: grade inflation which is doomed to lower the benchmark of education (Nash, 2015). Another trend in some educational institutions is their overemphasis on technology alone, which is prone to ignore other possibilities of better learning (Kern, Ware, &Warschauer, 2008).

At the personal level, the acceptance level of online learning among academic leaders, administrators and teachers is not very high. There are concerns that the learning outcomes of online education are not as good as those of on-campus programmes (Eman, 2010). A survey shows that there are around 25% of academic leaders in higher education who perceive that learning outcomes of online education are inferior compared to those of on-campus programs (Allen & Seaman, 2014). In addition, a number of instructors see online learning as posing extra demands on their already stressed tasks because they are not familiar with teachings conducted in online environments (Ko & Rossen, 2010).

Instructors' unwillingness to adopt online methods in their teaching would lead to a low quality of course design. Many online courses act as a mere medium of instruction because of their unsatisfactory designs (Chuang, 2010; Jung, 2005). For instance, computers in the classroom are only used to run courseware or play video or audio clips that are prepared by the teacher. Other creative online methods and designs, such as interactive labs, data analysis, critical and creative thinking, hands-on performances and scientific simulations, are seldom applied to assist in the class learning and teaching (Kim & Bonk, 2006). Improperly presented online systems can make learners feel depressed and confused, thus drain students' passion for learning (Tsurutani & Imura, 2015). The high drop rate of student attendance occurs if online learning is not well organised (Eman, 2010).

It is necessary to know that online learning may not be a welcome alternative for all students. Some students feel bored or frustrated before a computer (Zhang et al., 2004) or online instructional activities (Nash, 2015). Some students will be inattentive in online learning because of the various online distractions, such as games, online chatting, web surfing, music, and videos (Dahlstrom et al., 2014). More self-discipline is required from learners compared to the traditional classroom education (Nash, 2015). In many cases, when a student thinks about receiving education, he or she still prefers to choose a face-to-face course offered by an authorised educational institution (Zhang, Zhao, & Ning, 2012).

As for the technological barriers, apart from lack of hardware, low internet bandwidth and limited technology accessibility and usability, lack of technical support is also a prominent factor related to the success of online learning (Bashiruddin, Basit, & Naeem, 2010; Naveed, Muhammad, Sanober, Qureshi, & Shah, 2017). Specific training on technologies is in a dire need among educators and learners because ICT illiteracy greatly impedes effective online learning (Al-Azawei, Parslow, & Lundqvist, 2016). de la Campa Portela and Bocanegra-Valle (2007) found that the lack of such training is one of the major barriers that hinder the establishment of the CALL. However, few institutions provided proper online training to meet the actual needs (Hockly, 2015). A study shows that only 23%-45% of the online instructors actually received proper online training (Kim & Bonk, 2006). Since most of the pitfalls of online learning are more or less related to technological issues (Awidi, 2013), it is important to involve technical staff throughout the whole process of online learning.

This section has cast some light on major challenges that hinder the implementation of online learning. However, the influence of such barriers may vary in different circumstances, such

as different social, economic, and geographic conditions (Naveed et al., 2017). Taking these barriers into account, this research will explore the specific barriers to implementing effective online Maritime English education in China from the perspectives of both Maritime English teachers and maritime students.

2.2.3 The Quality Matters (QM) Rubric Standards

The Quality Matters Rubric Standards was first initiated by MarylandOnline, Inc. to provide a set of replicable and scalable methods to measure and guarantee online education quality (MarylandOnline, 2018). It involves the use of rubrics and peer review to evaluate the quality of an online course. The QM developers made references to the best practices and research achievements to develop a faculty-centred, peer-review process that could be applied to various online courses (Legon, 2015). The QM program has now received wide acceptance for the research-based rubrics and the inter-institutional, peer-review processes. It currently has more than 1,300 institutional subscribers and 52,000 trainees throughout the world (QualityMatters, 2018b).

QM developers (2018c) state that QM is founded on four underlying principles: continuous, centred, collegial and collaborative. The continuous principle indicates QM is a continuous program for educational institutions to assure the quality of online courses. The centred principle means QM is centred on three aspects: research, student learning, and quality. The third principle indicates, as part of a faculty-driven, peer-review process, the QM review process strives to be diagnostic and collegial instead of being evaluative and judgmental. The last principle means the QM review process uses collaboratively identified evidence reported in online courses and many ways can be used to meet every standard. The QM rubrics are a set of guides that are useful not only in creating, or evaluating online courses, but also in their strong adaptation when needed (Puzziferro & Shelton, 2008). The aim of the QM rubrics is to assure the quality of online course design (MarylandOnline, 2018), which is one aspect of this research topic. Therefore, the QM rubrics were served as one resource for this study.

Up till now, there have been six editions of QM Higher Education Rubric and the latest version with 8 general areas and 42 specific standards was released in mid-2018 (QualityMatters, 2018a). Compared to the fifth edition, the sixth edition has made some updates to its rubric standards, such as the merging of a few existing standards and additions relating to digital literacy skills, modelling academic integrity, commitment to accessibility,

and including a variety of technology (Wilson, 2019). The standards listed in QM are grouped into eight general standards that are essential for online or blended course design (Legon, 2015). The eight general standards consist of Course Overview and Introduction, Learning Objectives (Competencies), Assessment and Measurement, Instructional Materials, Learner Activities and Learner Interaction, Course Technology, Learner Support, and Accessibility and Usability.

Some QM rubrics may not be suitable for evaluating the present situation of online Maritime English education in China. For example, providing links to the institution's accessibility policies and services is not a common practice yet (Alizadeh, 2019). In addition, QM was designed for trained peer-review teams to evaluate the quality of online learning (Alizadeh, Mehran, Koguchi, & Takemura, 2019). In this research, the major participants were current maritime students and Maritime English teachers, who normally did not know whether "The instructional materials represent up-to-date practice in the discipline" or "The assessments used are sequenced" both of which are listed in the QM rubrics. Furthermore, effective online courses should accommodate the differing needs and backgrounds of multicultural learners (Gao & Legon, 2015). The different Chinese cultural characteristics require some adaptations of the QM standards. Therefore, this research adapted the QM rubrics to make them more relevant to the research aim, the practical situation, the specific quality criteria of Maritime English education in China and the Chinese background. As such, this research adapted the QM rubrics into the following five aspects: online assessment and feedback, online Maritime English learning materials, online learning interactions, technologies related to online Maritime English study, and technical support related to online Maritime English study. The design of these five aspects can be seen in Appendices 2 and 3.

2.2.4 Online learning readiness

Online learning readiness refers to the personal and environmental factors that facilitate the positive experience in an online instructional situation (Gunawardena & Duphorne, 2001). In this research, online learning readiness is measured from four aspects: (1) Self-efficacy of online Maritime English learning; (2) Self-management of online Maritime English learning; (3) Technology; and (4) Support. There is some literature that supports the effectiveness of this framework measuring online learning readiness.

Researchers have been developing a readiness scale for online learning over the years. For example, McVay (2000, 2001) designed a 13-item Readiness for Online Learning questionnaire for measuring readiness for online learning. Smith, Murphy, and Mahoney (2003) conducted a study with college students to test the reliability of McVay's (2000) questionnaire. Two primary factors were yielded from his study: "comfort with e-learning" and "self-management of learning." Later, Smith (2005) conducted a larger scale survey with Australian university students to provide further explanation of the previous results. After the survey, he confirmed that McVay's questionnaire was a valid and reliable instrument for assessing student readiness for online learning (Smith, 2005). However, some researchers think these scales for measuring online readiness did not cover other critical dimensions of online learning, such as the factors related to the technical aspect, which were absent from McVay's instrument (Hung, Chou, Chen, & Own, 2010).

Research shows self-efficacy should be considered as a key variable that may influence the level of readiness for online learning (Joo, Bong, & Choi, 2000; Puzziferro, 2008; Wang & Newlin, 2002). Bandura (1997) defines self-efficacy as the judgment about one's capabilities to carry out a specific task to gain desired outcomes. Self-efficacy of online learning pertains to learners' ability to use the devices necessary for online learning and their confidence in performing tasks related to ICT technology (Puzziferro, 2008). It not only implies "comfort with e-learning" as suggested by the above-mentioned studies but also includes the predictor of student motivation (Bandura, 1997). Kim, Wang, Ahn, and Bong (2015) confirm that a positive relationship exists between self-efficacy and the use of self-regulated learning strategies for English language learning. There also exists a positive relationship between the perceived level of language proficiency and the sense of self-efficacy (Eslami & Fatahi, 2008). On account that online studies are conducted with the aid of networks and electronic devices, it would be necessary to have related assessments concerning the participants' self-efficacy of online learning. For the above reasons, this research adopted "self-efficacy in online learning" instead of "comfort with e-learning" as a factor to explore readiness.

The "self-management of learning" factor is recognisable in the various terms of "self-regulation of learning (Fisher & Baird, 2005)", "self-discipline of learning (Kauffman, 2015; Waschull, 2005)", "independent learning (Kerr, Rynearson, & Kerr, 2006)" or "self-directedness in learning (Garrison, 2003; Papanagnou, Sicks, & Hollander, 2015)" in other studies and reports. Although there are some differences in the scope of these terms, they all

cover one's ability to manage time, set goals, balance multiple tasks, and one's disposition regarding self-motivation, self-discipline, and personal responsibility (Kerr et al., 2006). Since online learning is a student-centred environment and could provide higher mobility and flexibility, students with high levels of self-management ability are more likely to have better learning outcomes (Keramati, Afshari-Mofrad, & Kamrani, 2011). Therefore, self-management of learning is considered as an influential factor in adopting online Maritime English learning by adult students.

While technical readiness does not seem to directly affect learning achievement, it does influence students' level of engagement and learning outcomes in the course instructed through the network (Watkins, Leigh, & Triner, 2004). Such considerations are absent from McVay's instrument. Dray, Lowenthal, Miszkiewicz, Ruiz‐Primo, and Marczynski (2011) reconceptualised readiness by combining learner characteristics and technology capabilities to develop a more comprehensive instrument. According to Dray et al. (2011), the factors confirmed by McVay (2001) and Smith (2005), and other yielded factors, such as orientation to time and time management, individual beliefs in their ability to complete a college degree, self-efficacy in writing and expression, beliefs about responsibility in problem-solving, and behavior regulation for goal attainment, fall into the first subscale which aims to measure learner characteristics. The second subscale, which refers to technology capabilities, expands the previous results by including four aspects of technology capabilities: basic technology skills, access to technology, usage of technology, and relationship with ICT (Dray et al., 2011). Since online learning is delivered by using ICT, it is necessary to obtain related assessments regarding individuals' perceptions of technology and its related support. Darab and Montazer (2011) maintain that technology and support are essential elements to be taken into account in online learning.

Overall, the learning readiness variable of this study will take the following dimensions into account: (1) self-efficacy of online Maritime English learning; (2) self-management of online Maritime English learning; (3) technical readiness; and (4) support for online Maritime English learning. Deficiency in any dimension of readiness could be a barrier to implementing online learning. The design of these four aspects can be seen in Appendices 2 and 3.

2.3 English for specific purposes (ESP) learning

2.3.1 The characteristics of ESP

ESP, evolved from a branch of English Language Teaching (ELT), has become a distinct interdisciplinary activity since the 1960s (Salas, Mercado, Ouedraogo, & Musetti, 2013). As its name indicates, ESP is a language approach based on learners' actual needs (Hutchinson & Waters, 1987). Therefore, from the beginning of its establishment, ESP distinguishes itself in the aspects of teaching aims, pedagogical methods, learning theories and learning environment.

ESP learners intend to use English for professional communication or for the performance of some career-related activities. The main purpose of ESP is not to gain high English proficiency, but to realise a specific goal by integrating English into learners' subject specialism (Jiang, Li, & Zhao, 2011; Rahman, 2015). Generally, English for Academic Purpose (EAP) and English for Occupational Purposes (EOP) are considered as two major subsets of ESP (Dudley-Evans & St John, 1998). EAP focuses more on the timely embodiment of the current trends of the target special area, while EOP puts more considerations on providing authentic work-related study (Johns & Salmani Nodoushan, 2015).

The awareness of needs is a major difference between ESP and General English (GE) (Hutchinson & Waters, 1987). Therefore, ESP is a goal-directed (Robinson, 1991) and student-centred (Butler-Pascoe & Wiburg, 2003) approach to language education. All the aspects of ESP, such as the choices of teaching materials and teaching methods, are built on students' needs and targets of learning (Hutchinson & Waters, 1987). Unlike GE, which places an equal emphasis on all four basic language skills (listening, speaking, reading and writing), ESP focuses on special language skills which are determined by needs analysis (Rahman, 2015).

Dudley-Evans and St John (1998, pp. 4-5) provide a definition of ESP with three absolute characteristics and four variable characteristics:

> *Absolute characteristics include 1) ESP is designed to meet specific needs of the learner; 2) ESP makes use of the underlying methodology and activities of the disciplines it*

serves; and 3) ESP is centred on the language (grammar, lexis, register), skills, discourse and genre appropriate to these activities.

Variable characteristics are 1) ESP may be related to or designed for specific disciplines; 2) ESP may use, in specific teaching situations, a different methodology from that of GE; 3) ESP is likely to be designed for adult learners either in the tertiary education or in a professional work situation. It could, however, be used for learners at secondary school level; and 4) ESP is generally designed for intermediate or advanced students.

The first absolute characteristic of ESP is drawn from its specific discourse background. To better understand or practice professional activities in English, ESP courses not only need to focus on the delivery of vocabulary and the application of the special terminology, but also consider "the professional communicative tasks, the genre or formats of those communicative tasks and the modalities through which they are enacted" (Salas et al., 2013, p. 13). A big part of ESP instruction is to determine and set priorities of the genres, teaching tasks and communication modalities that mark the practices of a professional field (Hutchinson & Waters, 1987).

The second absolute characteristic implies that the underlying methodology of the broad discipline should be reflected in the teaching (Dudley-Evans & St John, 1998). There is no specific ESP methodology (Hutchinson & Waters, 1987). Although the methodologies used in GE can be applicable in the realm of ESP, in more specific ESP teaching, the instructor often acts as a language consultant, interacting equally with learners (Dudley-Evans & St John, 1998).

In view of the fact that ESP is an integration of English and subject specialism, the third absolute characteristic of ESP derives from its language aspect. Despite the fact that ESP has its specific learning purposes, it shares a common basis of language teaching with GE and some language instruction skills of GE would be effective to deliver ESP courses (Hutchinson & Waters, 1987). An understanding of the basic language learning principles is the foundation of successful ESP instruction (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987).

2.3.2 Needs analysis

To implement effective ESP education, it is necessary to realise different learners have different learning targets and inclination which have a profound influence on the results of ESP learning (Hutchinson & Waters, 1987). Needs analysis is a process used to identify the purposes and priorities of ESP learning, then find suitable ways to develop teaching materials and teaching methods of an ESP course (Dudley-Evans & St John, 1998; Rossi, Lipsey, & Freeman, 2003). It is critical for the success of ESP because it decides which aspects of language are important for learners with specific focuses (West, 1994). The principal idea behind the needs analysis approach is that learners have some particular reasons to take an ESP course and it is the responsibility of the ESP instructors to determine these elements and to design and deliver the ESP course appropriate to learners (Johns & Dudley-Evans, 1991). Needs analysis is more related to the nature of specific situations (Strevens, 1980). The aim of needs analysis is to identify the special professional needs of learners in the course of English learning (Robinson, 1991).

Needs analysis has evolved from simple, pre-course processes (Munby, 1981) to relatively sophisticated, repeated procedures (Johns & Dudley-Evans, 1991). In most cases, needs analysis is a pragmatic process which draws data from multiple sources (Salas et al., 2013), including current and future requirements of learners, trends of the specific field, language proficiency of learners, learners' professional activities, present teaching limitations, and the opinions of the target receivers. Instead of a once-for-all process, some scholars suggest three stages for needs analysis: pre-course, initial and ongoing (Graves, 2000), which means needs analysis is a kind of procedure whose conclusions should be periodically checked and re-assessed (Drobnic, Trimble, & Trimble, 1978; Hutchinson & Waters, 1987). It should be viewed as an integrated component of the learning process (Robinson, 1991) rather than an independent procedure. In the case that it is impossible to meet all the needs gathered from needs analysis, ESP practitioners should define the realistic scope of the course in terms of resources, time and the demands of the course sponsors (Montero, 2009) and negotiate the different expectations in advance (Salas et al., 2013). Needs analysis can be conducted by using various tools, including questionnaire, interview, observation, assessment and analysis of professional materials (Hutchinson & Waters, 1987; Rahman, 2015; Robinson, 1991).

Dudley-Evans and St John (1998) identified three basic components of needs analysis: Target Situation Analysis (TSA), Learning Situation Analysis (LSA), and Present Situation Analysis

(PSA); and one adjunct factor: Means Analysis (MA). Following are the explanations for the three components provided by Dudley-Evans and St John (1998): TSA stands for objective needs, such as perceived needs which are drawn by outsiders from the facts that exist or can be verified, and product-oriented needs which are drawn from the goal or target environment. LSA estimates subjective or felt needs which are drawn from insiders. Normally, it is related to cognitive and affective factors, and process-oriented needs which are drawn from the learning situation. PSA tries to examine the strengths and weaknesses in the learning experience. MA investigates the situation that an ESP course will be performed, and it is regarded as a supplement to needs analysis in the establishment of a feasible ESP design. The assumption underlying MA is that what runs smoothly in one environment may not be effective in another. Classroom culture and management infrastructure are two vital elements to be considered for MA.

Hutchinson and Waters (1987) probe needs analysis through two categories: target needs and learning needs. They suggest that target needs is effectively investigated from three perspectives: necessities, lacks and wants. Necessities represents the requirements of learners' language in their target circumstance, in other words, what students should know for them to perform effectively in their professional situation. Lacks refers to the gap between the purposed target requirements and the language skills already possessed by learners. Wants is associated with learners' motivation and desire in the language learning. Although there may be contradictories among the three elements, it is very important for ESP instructors and ESP course designers to realise and consider the existence of such divergence and to negotiate in advance. Learning needs concerns about the method that is effective for specific learners in an ESP classroom, because learners' motivation in the workplace may be different from that in the classroom. Target needs helps to identify learning aims from the perspective of the target situation while learning needs endeavours to find an effective way to meet learning requirements through classroom teaching.

From the discussions above, needs analysis is a continuous process throughout ESP learning, which is essential for ensuring the quality of ESP education. Since Maritime English is a subset of ESP, the needs analysis of this research is mainly based on Hutchinson and Waters' research results (Hutchinson & Waters, 1987). However, in this specific research, needs analysis mainly focuses on learning needs on account that the three elements of target needs are covered by the literature. Specifically, the requirements of Maritime English are

stipulated in the STCW Manila Amendments which should be observed by all the MET institutions in China. The lacks are evident in the fact that most of Chinese seafarers lack the ability to effectively communicate on board, especially in speaking (Fan et al., 2017a; Wang et al., 2017). Generally, Chinese maritime students' motivation for learning Maritime English is to equip themselves with appropriate English proficiency so that they can smoothly and safely carry out their jobs on foreign ships. Therefore, the identification of learning needs, which facilitates the construction of effective teaching methods for Chinese maritime students, was within the scope of this research. The learning needs in this research were explored in five aspects: the needs for online assessment and feedback, the needs for online learning materials, the needs for online learning interactions, the needs for technology and the needs for relevant support, which covers the main aspects of online Maritime English education in China. The design of these five aspects can be seen in Appendices 2 and 3.

2.3.3 Learning theories related to language education

The success of language education lies more in understanding the structure and processes of human mind than in the research of the nature of language (Hutchinson & Waters, 1987). Learning theories set the ground for writing curriculum and syllabus, choosing learning resources, designing and implementing teaching activities and guiding learners' activities (Fan, 2011; Leflore, 2000). A better comprehension of the related theories is critical in probing practical ESP education.

Due to the complexity of the learning process which is influenced by a variety of factors, enormous diversity exists in learning theories that underpin ESP. Among them, behaviourism, cognitivism, and constructivism are considered as the three major theoretical frameworks underpinning the learning process (Alviárez, Romero, Pérez, & Delmastro, 2010) and they are still exerting a deep influence on the field of education (Ertmer & Newby, 1993), including ESP and online learning.

2.3.3.1 Behaviourism

Based on the assumption that individual behaviour is profoundly influenced by the external events and the result of learning can be embodied in the changed behaviour of learners, behaviourism generally regards learning as a mechanical process of habit formation which can be reinforced by frequent stimulus-response sequences (Hutchinson & Waters, 1987). Therefore, behaviourist theory of learning maintains that teaching is the arrangement of

special reinforcement, such as stimulus, reward and punishment, that facilitates the behaviour which would otherwise be appeared much later or never occur (Skinner, 1957). The observation and measurement of behaviour are indexes of learning results (Stavredes, 2011). Programs influenced by behaviourism are prone to be designed in a linear structure, putting emphasis on the activities like repetition, memorisation and structural mechanical practices (Richards & Rodgers, 2014). In this way, learners are passive receivers of information (Dailygrin, 2010).

Many scholars hold opponent views against behaviourism. For example, Chomsky (1959) argued that language learning does not depend on the application of reinforcement and behaviourist learning model cannot explain various facts about language acquisition. Vygotsky (1962) regarded behaviourism as an approach being too narrow, specialised, isolated, and intrapersonal. Some experts dismissed behaviourism for its emphasis on passive perception, memorisation and mechanical learning (Fox, 2001). However, many of its positive impacts have come along with us from the early stage of CAL into present educational scenarios. Behaviouristic principles can be found in early computer learning systems, programmed instruction, interactive branching scenarios (Keramida, 2015) and some of today's instructional computer software (Ebert, 2012). It is especially effective in the mastery of preliminary information or terms, descriptions of components, and theories behind technical processes (Ebert, 2012) by reinforcing wanted and weakening unwanted actions (Keramida, 2015). Shield (2000) believed that behaviouristic practices are still prevalent in today's digital world.

Behaviourism has become the theoretical foundation of some language education practices. ESP, as it pertains to professional and technical education, is largely underpinned by behaviourism (Ebert, 2012). Many language teaching methods that may be applied in the area of ESP embody the views of behaviourism, such as Audio-lingual Method Total Physical Response, and Silent Way (Marcu, 2014; Richards & Rodgers, 2014). Up till now, behaviouristic theory still forms one of the major foundations of ESP diagnostic testing (Forteza Fernández & Gunashekar, 2009). In applying behaviourism into testing, it is easy to identify the detailed points of items like grammar, vocabulary or items with objective answers like multiple-choice (Dunkley, 2012).

2.3.3.2 Cognitivism

Cognitivist theory is underpinned by the development of cognitive science which endeavours to investigate the operations of human brain when it comes to knowledge acquisition (Davidko, 2011). Contrary to the principles of behaviourism, cognitivist theory sees the learner as an active processor of knowledge (Ausubel, Novak, & Hanesian, 1978). According to cognitivist theory, learning is an internal mental process that organises information and identifies meanings from the outside world (Hutchinson & Waters, 1987). The purpose of learning is to facilitate and strengthen this process (Fan, 2011). Its focal problem is to conceptualise learning procedure and to explore the brain workings of information processing (Thompson, Simonson, & Hargrave, 1996). Cognitivist theory acknowledges the importance of individual differences (Ally, 2008) and maintains mental schemas and frameworks are built to assist learning experience (Leflore, 2000).

Cognitivist theory is seen as an important theoretical foundation of ESP learning. Although cognitivist scholars have disagreements regarding the relationship between cognitive development and language learning: some believe cognitive development happens before language learning (Piaget, 1952) while some others assert that it is language that determines human cognitive pattern (Sapir, 1921; Whorf, 1956), most of them agree that the aim of learning a language is to communicate and language learning should be based on learners' communicative needs (Alviárez et al., 2010). The development of cognitive process is involved in the procedure of foreign language learning. On account that language in cognitivism is studied in terms of functions, notions and rules formation, cognitivist theory puts equal emphasis on the learning process, teaching and learning strategies as well as the final outcomes (Richards & Rodgers, 2014).

Cognitivist theory exerts a deep influence on the realm of online learning. ICT is more cognitivist in nature by providing access to a great variety of formats and materials that cater to students' various learning styles (Hanson-Smith & Rilling, 2007). Individual differences propel cognitivist educators to develop more engaging and effective online programs and to incorporate various pedagogical strategies to meet the multiple needs of learners (Stavredes, 2011). Gee (1990) finds that when instructional environment and teaching methods comply with cognitivist theory, there will be a great increase in students' involvement, commitment and enjoyment during the learning process. In addition, cognitivist theory is instrumental for online learning in constructing leaners' mental schemas and framework as well as offering

alternative learning methods, strategies, and tools which have the potential to help learners organise meanings (Fan, 2011; Leflore, 2000).

2.3.3.3 Constructivism

Constructivism assumes that learners exert an active role in constructing their own knowledge from their experiences (Doolittle & Camp, 1999) and knowledge construction is a complex process gained through the transformation of experiences (Alviárez et al., 2010). Typically, there are two main types of constructivism: cognitive constructivism and social constructivism (Flippen, 2014; Powell & Kalina, 2009).

Cognitive constructivism is developed from cognitivist theory and is commonly considered as a branch of cognitivism (Fan, 2011). Cognitive constructivism and cognitivism share some common principles, such as the postulations on knowledge acquisition, the stresses on learners' active role in the learning process and the views of language functional nature (Alviárez et al., 2010). Generally, cognitive constructivism emphasises individuals' efforts to acquire knowledge (Flippen, 2014). From the cognitive constructivist perspective, knowledge is the result of the internal construction of the outside information via personal observation and experimentation (Piaget, 1970).

Social constructivism argues that knowledge is socially constructed and is gained in particular social and cultural contexts. Collaboration, interaction, involvement, creative knowledge construction, and reflection on feedback are the influential factors that affect learning (Furtado, Furtado, Mattos, & Vanderdonckt, 2003; Mayes, 2006; Vygotsky, 1978). From the social constructivist position, knowledge should be gained through active construction and contextualisation other than via passive reception (Ally, 2008; Huerta, Ryan, & Igbaria, 2003).

Cognitive constructivism and social constructivism propose different paths towards knowledge construction, but common grounds can be found for both types of constructivism. For learners, both theories hold that learners should be active in the learning process rather than passive; learners need their previous experience to reconstruct external reality; and learners' motivation and autonomy are crucial in knowledge acquisition (Palmer, 2005). Regarding teachers, both theories believe that teachers transform their roles from controllers to facilitators in the process of study (Jonassen, 1994). In order to be a successful facilitator, teachers should make the content relevant and meaningful to students (Weegar & Pacis,

2012); provide multiple perspectives and representations of content; and continually assess students' learning (Doolittle & Camp, 1999).

Constructivism facilitates ESP learning in many ways. The student-centred trait of ESP fits well with the principles of constructivism theory. For instance, ESP learning should take place in an authentic environment (Doolittle & Camp, 1999). Many methods that embrace constructivist educational philosophy are used in field of ESP teaching, such as, communicative language teaching which aims to help students produce authentic language and communicate with others (Banciu & Jirechie, 2012), cooperative learning which focuses on the cooperation of individuals (Hsiung, 2013), guided instruction which employs all kinds of strategies to guide students in completing a certain learning task (Frey & Fisher, 2010), and discovery learning which encourages learners to explore problems and discover facts on their own (Bruner, 1961).

The concurrence of constructivist theory and the rapid development of ICT has made education better at providing authentic materials (Kimball, 1998), enhancing student-centred learning (Fan, 2011) and facilitating communication (Živković, 2014). Online learning should be developed in alignment with the principle of constructivism as it enables students to be active and collaborative (Živković, 2014) in the technology-based learning environment. Along with increased applications of online technologies, the issues related to problem-solving (Ebert, 2012) and individual differences (Ally, 2008) draw the attention of educators. Students' learning autonomy and motivation will be greatly stimulated by introducing network and open-end software into a learning process (Müller, Gil, Hernández, Giró, & Bosco, 2007).

From the aforementioned analysis, it is apparent that the three influential learning theories have their own characteristics and represent variants of theoretical and ideological emphases. Behaviourism is appropriate for teaching and learning of facts, the cognitivist theory can be applied in teaching processes and principles, and constructivism is more suitable for real-life applications and contextual learning (Ally, 2008; Ertmer & Newby, 1993). Since different language learners have their specific difficulties in the process of language learning, the integration of online methods into education generally needs to consider the principles of language learning derived from different learning theories. To provide an ideal environment and successful learning experiences for all students, a comprehensive application of the three theories is necessary for practical education.

2.3.4 Online technological applications in ESP learning

Technology influences the field of ESP profoundly. Designing and implementing new pedagogies with ICT methods are now considered as a key factor to enhance the effectiveness of ESP education. Educators and learners gradually need both professional knowledge and technological skills for brighter career development (Shetzer & Warschauer, 2000). In line with this trend, a range of studies are conducted to probe the relationships between ESP education and various ICT methods.

This section explores technological applications in ESP learning from three perspectives: multimedia software, digital devices, and web-based environment. Specifically, if a study endeavours to explore the effect of ESP learning assisted by specific multimedia software, then it is categorised as the application of multimedia software. In the case that research focuses on the function of the digital device, it falls into the category of the application of digital devices. ESP education in the context of web-based learning environment examines the research relating to web-based resources or products.

2.3.4.1 The application of multimedia software

On account that well-designed multimedia software, which coherently incorporates subject knowledge, language skills, and professional expertise, can make a learning environment favourable for ESP study, various multimedia software has now been applied in classroom lectures, especially in the area of sciences and technology (Tsai, 2011).

Vetter and Chanier (2006) studied oral communication among heterogeneous learners in an audio-synchronous and multimodal environment created by a kind of audio-graphic, internet-based CMC software—Lyceum. They found that their learners became satisfied with the learning environment created by using Lyceum in a relatively short time of practice. With higher satisfaction rates, learners' participation in oral communication was enhanced instead of being constrained by their heterogeneous linguistic levels. Another study on the application of Lyceum was conducted by Ciekanski and Chanier (2008). They aimed to better understand the multimodal communication in an audio-graphic synchronous environment and to explore its relationship with writing. Their research found that the multimodal learning environment created by the use of Lyceum can shift learners' focus from their writing results to the writing process. In addition, this online environment may enrich the learner's

communication repertoire and can improve the learner's communication by providing a set of compensatory strategies.

Similarly, Shamsudin and Nesi (2006) designed research aimed at developing specified language skills by using Microsoft Windows NetMeeting Version 3.01 as a tool to carry out synchronous communication at Universiti Teknologi Malaysia. Microsoft Windows NetMeeting is an internet-based video conferencing system whose features include whiteboard, live video, live audio, file transfer, chat, and application sharing (Legutko, 2007). The findings supported the idea that a synchronous communication environment can foster learners' oral proficiency for ESP. It was also found that the applications of modalities, such as word-processing, whiteboard and concept mapping, in the design of learning activities may help learners maintain professional conversations.

One more example is the research finding of Tsai (2011) who studied the performance of ESP multimedia courseware in oral presentations of non-English major students in a Taiwan university. As reported, the majority of the participants believed that they had made progress in their learning, improved their effectiveness in preparing speech scripts and gained more interest in learning English. In addition, the multiple supports offered by the ESP multimedia courseware, such as online evaluation, narration, linguistic guidance, and translation, were considered especially useful for non-English major students who normally had a low English proficiency. The author concluded that a combination of quality multimedia courseware and teachers' intervention could exert a positive effect on acquiring both professional knowledge and language skills.

Furthermore, Sevilla-Pavón et al. (2012) designed a project using Digital Storytelling, a powerful pedagogical tool, to improve students' acquaintance with grammatical features and lexis that are specific to technical English. Totally, 52 participants who majored in aerospace engineering took part in the course. At the end of this project, students were quite satisfied with their progress made with the aid of Digital Storytelling. Moreover, they were more confident and open-minded in solving the difficulties encountered during the learning process.

Generally, the application of multimedia software positively influences ESP education in many ways. When such software is integrated into well-designed ESP courses, the degree of students' participation, their professional communication ability and the rate of their satisfaction are enhanced. With the help provided by multimedia software, students have a

more positive attitude towards learning. They begin caring about what to learn and how to learn rather than the end results.

2.3.4.2 The application of digital devices

Nowadays, digital devices equipped with online technology enable learners to engage in their learning anywhere and anytime. Given the growing use of the numerous digital devices, including personal computers, wireless laptops, mobile phones, iPod Touch, and tablet computers, there has been an increasing interest in applying digital devices to support ESP learning.

Sokolova, Golovacheva, et al. (2015) assessed the communicative activities within an ESP course implemented in a computer-assisted learning environment. The results show the integration of the CAL environment and professionally oriented communicative language teaching facilitated the development of online ESP courses. The use of online ESP resources was found to boost students' motivation and readiness for self-directed English learning and willingness to work independently. Students became more responsible, sharpened their critical thinking and developed their ability to make decisions. All the results indicated that the communicative activities assisted by computers made learning an enjoyable process and improved students' professional communication competence. The ESP courses assisted by the computer were beneficial to the creation of a natural, authentic language environment.

Yang (2013) explored students' ESP awareness in an intercultural computer-supported collaborative learning community. The results show that the investigated online community supported by the computer could not only stimulate students' language ability but also enhance their problem-solving abilities and collaborative skills. Students learned expressions from their peers with different backgrounds during intercultural communication. Based on previous studies, Yang (2015) endeavoured to develop students' autonomy in self-directed ESP learning via online community with the assistance of the computer. The results of the research revealed that students' willingness to become autonomous learners could be cultivated through taking part in online community. Computers can develop students' autonomy by providing approaches to download learning materials, monitor and assess students' learning process, and encourage peer interactions. Students' autonomy developed through the aid of the computer helped students gain significantly better results in the tests.

The wide acceptance of mobile devices has made MAL possible in ESP learning. As mentioned in Section 2.2.1.1, the focus of MAL has been placed on learning mobility (Sharples, 2006) and mobile devices include any mobile devices that are portable, autonomous and convenient to perform educational activities anytime (Trifonova et al., 2004). Alkhezzi (2016) investigated the effectiveness of mobile phones in teaching allied health-related vocabulary to learners at Kuwait University. The research showed mobile phones helped students master the new vocabulary and get better results in their grammar quizzes. The employment of mobile phones was also found to exert a positive impact on the general academic performance of students. Simonova (2016) conducted a research study to explore the application of mobile phones in one study program among the students majoring in technology and engineering in higher education. As found from the results, all the participants, including teachers and students considered mobile phones useful and easy to use. The findings showed the application of mobile phone had positive impact on individualisation, collaboration and authenticity. The ESP learning assisted by mobile was motivating and enjoyable, providing more possibilities for education.

iPod Touch has emerged as a pocket computer equipped with a variety of media capabilities (Banister, 2010). The handheld device permits performing audio, image, and video documents, sharing content with others, making records and being accessed through headphones by individuals (Banister, 2010). Compared to other digital devices, such as laptops or computers, iPod Touch has higher cost-effectiveness, portability and durability (Auchincloss & McIntyre, 2008). With its powerful functions, it can perform a multitude of tasks required in education at anyplace and anytime. Papadima-Sophocleous (2015) conducted a research project to determine the effectiveness of a 6-week out-of-class program, which was supported by iPod Touch. The results showed that the oral reading fluency of the 16 first-year ESP students of Cyprus University of Technology was significantly improved with different degrees. Students appreciated the flexible learning environment created by the use of iPod Touch. Another research project performed by Palalas (2011) through iPod Touch also found MAL to be an effective solution for teaching ESP to adult learners, and to improve flexibility and individualization of teaching.

On the whole, the studies on the ESP learning conducted through various digital devices concluded that digital devices generally had a positive impact on the outcomes of teaching and learning. Digital devices not only had the potential to improve students' achievements in

ESP learning, but also enhance their level of confidence and learning abilities. The powerful functions of digital devices have provided immense opportunities for ESP learning.

2.3.4.3 Web-based learning environment

Many sophisticated web-based learning environments have been developed and applied in ESP education. Web-based environment can incorporate many useful tools for teaching and learning, such as synchronous and asynchronous conferencing systems, course content delivery tools, grade reporting systems, polling and quiz modules, management of teaching materials, whiteboards, online communities, logbooks, assessment and evaluation (Zaïane, 2001). Many studies have been conducted to explore the integration of web-based learning environment in teaching and learning or assess the effects of the application of web-based learning environment.

Bradley, Lindström, and Rystedt (2010) conducted research on collaborative writing through the implementation of wiki in an ESP pedagogical environment. The results showed that wiki was a medium particularly suitable for collaborative writing. The medium allowed more revisions to improve text production, which had a positive potential for ESP education. Creating a joint wiki page required learners to be creative and use their own judgement in examining and assessing others' ideas, which could enhance their creativity and cultivate their critical thinking ability. The analysis implied that wiki could make contributions to writing skills and peer responses. The research found that although there were a number of ways for the ESP learners using wiki to engage in peer reviewing, a higher number of edits in the assignments were achieved through the collaborating groups that produced more versions of revised text. The fact that wiki acted effectively as a collaborative platform indicated that students were willing to enjoy the benefits of peer collaboration on their assignments.

Thang et al. (2012) used a blended approach to teach ESP with the integration of a web-based management system in order to discover Malaysian students' perceptions towards redesigned course materials. The findings revealed that students generally held a positive attitude towards the designed online activities and enjoyed the advantages of online learning provided that the internet connection was reliable and their online workload was not too heavy.

Shih conducted two studies to explore teaching English for Hospitality and Tourism in a blended mode through blog (Shih, 2012) and Facebook (Shih, 2013) respectively. Although applying a blended approach to ESP teaching required extra efforts from both teachers and

students, the outcomes of the research manifested the effectiveness of the learning model. On the one hand, the versatile applications of blogs and Facebook enabled students to benefit from various activities, such as collaborative learning, peer review, and getting feedback. On the other hand, blog and Facebook made students more sociable because they had less social pressure online than in face-to-face circumstances. If the blended approach was well planned, it could not only improve students' professional skills but also contribute to their learning effectiveness and satisfaction of an ESP course.

There are many other software applications, digital devices and web-based applications being used in ESP learning and teaching, such as CLA Siena Online (Mesh, 2004), the network-based electronic teaching package (NBETP) (Sokolova, Rostovtseva, & Wasilewski, 2015), CD-ROM (Simonova & Poulova, 2015), e-mail (Kutlu, 2013) and mobile devices (Li & Leina, 2012). The general reflections on the research are positive towards these various online methods and they are regarded as conducive and complementary to traditional ESP courses. However, it does not mean all the research studies on online ESP learning get positive results. For example, Joulia (2012) found that after the implementation of a computer-assisted reading application, students neither improved their comprehension, process strategies and their understandings of the relevance of macro aids nor did they develop an interactive approach to reading.

2.4 Maritime English education

2.4.1 Domain of Maritime English

Maritime English, sometimes also termed as Nautical English, Navigation English, Seafarer's English, English for Mariners, or Seafaring in English, can be defined as "the entirety of all those means of the English language which being used as a device for communication within the international maritime community, contribute to the safety of navigation and the facilitation of the seaborne trade" (Trenkner, 2000, p. 7). It distinguishes itself in its unique vocabulary, terminology, abbreviation, and application.

The domain of Maritime English has changed greatly with the development of the shipping industry. Narrowly, its domain is limited to the English used in Navigation, Marine Engineering and maritime treaty (Lin, 2004). Broadly, it covers all the English language used as means of communication in maritime communities and activities (Luo, 2008), including

general English, general Maritime English, Maritime English for Navigation, Maritime English for Marine Engineering, Maritime English for ship's documentation and correspondence, Maritime English for radio communication, Standard Marine Communication Phrases (SMCP), Maritime English for IMO conventions, regulations, manuals, and other documents, Maritime English for semiotic systems, Maritime English for visual aids (Demydenko, 2012) and Maritime English for electro-technical officers (Fan, Fei, Schriever, & Fan, 2014). Wang and Zhang (2014) maintain that new elements like maritime economy, new technology, maritime culture, should also be incorporated into Maritime English.

Therefore, Maritime English is a kind of sublanguage systematically used to communicate among people with different mother tongues (Demydenko, 2012). As a professional language for global communication, it serves the special purposes and requirements of the maritime industry (Trenkner, 2000). As discussed in the last paragraph, its domain involves various language resources. The development of Maritime English is influenced by language requirements in the field of seafaring and shipping (Demydenko, 2012).

2.4.2 Maritime English as a subset of ESP

As a subset of ESP, Maritime English differs from other types of ESP in the frequency of occurrence and usage of certain linguistic forms and the specific choice of lexical, grammatical or pragmatic features of EGP (Cole, Pritchard, & Trenkner, 2007). The primary aim of Maritime English is to facilitate communication at sea (Gabrielli, 2016). The effectiveness of communication in English on board can be greatly affected by the following aspects: multicultural and multilingual crewing, communication via man-machine interface (i.e. communication with electronic equipment), communication in hierarchical organisation (i.e. management, operation and support levels) and the work environment on board (i.e. psychosocial stress and physical stress) (Fan, Fei, Schriever, & Fan, 2016).

Maritime English is a discipline established both in the maritime curriculum and in the shipping industry (Bocanegra-Valle, 2010). To achieve effective Maritime English communication, various technical content courses have been integrated into the teaching of Maritime English (Gabrielli, 2016). In the process of designing and carrying out learning activities, Maritime English instructors should collaborate with technical experts to familiarise themselves with the communication processes that would happen at sea, and to

identify professional contexts that integrate various communication skills (Gabrielli, 2016). Building on the ESP principles, Cole et al. (2007, p. 139) list some issues that need to be considered before the delivery of Maritime English courses:

- *the communicative approach to learning and teaching Maritime English;*
- *the role of content-based learning;*
- *competence-based learning as the basic IMO requirement;*
- *the typology of Maritime English and ESP;*
- *the Maritime English instructor as user, adaptor and developer of Maritime English teaching resources (textbooks/course books and related materials);*
- *modern Maritime English teaching resources and computer-assisted language learning tools;*
- *the Maritime English instructor as curriculum developer and course designer—conducing needs analysis; and*
- *issues of Assessment and Evaluation.*

2.4.3 Requirements of Maritime English regulated by IMO

The globalisation of seafarers' labour market has exerted a profound influence on shipping and seafaring. The mixed nationality crews on board and their associated communication issues have prompted efforts to introduce a common language used by seafarers in order to reduce communication-related maritime accidents (Sampson & Zhao, 2003). Accompanied by the trend of linguistic globalisation, English has been stipulated as the working language for seafaring by the International Maritime Organisation (IMO) (IMO, 2001). In spite of the fact that the overall framework of Maritime English is defined by international standards and legislation, Maritime English still remains difficult to grasp and a challenging subject at MET institutions worldwide (Gabrielli, 2016). As a lingua franca used by seafarers of different nationalities, the requirements of Maritime English have been developed with the changing conditions in modern seafaring.

Initially, the Standard Marine Navigational Vocabulary (SMNV) was introduced by IMO in 1977 and was amended in 1985 and 1987 with an attempt to standardise a set of maritime vocabulary (Cole & Trenkner, 2008). It put more emphasis on ship-shore communication than on communication between seafarers (Sampson & Zhao, 2003) and in this way, it could

only be used as a codebook or signal book because it was not linguistically generative (Strevens & Johnson, 1983).

Later, Standard Marine Communication Phrases (SMCP) were adopted by the 22nd Assembly in 2001 as a more comprehensive standardised safety language covering a larger number of topics than SMNV (IMO, 2001). The major change was in the section of onboard communication, which embodied the first official recognition of the importance of the communications both on board and ashore (Sampson & Zhao, 2003). It is required in the International Convention for the Safety of Life at Sea (SOLAS) that the certified officers on a navigational watch on ships of 500 gross tonnages or more should have the ability to understand and use the SMCP (IMO, 2001). However, although the SMCP contributes considerably to the standardisation of technical and functional English of seafaring, it hardly examines the social aspects of daily communication among the crew (Dimitrova, 2010; Sampson & Zhao, 2003).

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) is the international instrument which sets forth commonly agreed standards of training, certification and watchkeeping for worldwide crews (Young, 1995). It was initially proposed in 1978 and was significantly amended in 1995 and 2010. The latest revision, known as the Manila Amendments, has entered into force since January 1, 2012, with higher mandatory demands on Maritime English teaching and learning at MET institutions (Trenkner & Cole, 2010b).

Under the International Regulation on STCW 2010, the status of Maritime English has been legitimated as an official professional subject rather than as a secondary or complementary subject (Dirgayasa, 2014). The requirements related to Maritime English, such as the ability to use Maritime English in work-related activities and the ability to share and exchange information, are for the first time introduced as a mandatory technical standard contained in Part A of the STCW 2010 (Kang et al., 2013). The general requirements for Maritime English read as follows (IMO, 2010a, p.16):

> *Regulation I/14*
>
> *1 Each Administration… shall require every company to ensure that:*

at all times on board its ships there shall be effective oral communication in accordance with chapter V, regulation 14, paragraphs 3 and 4 of the SOLAS Convention as amended".

The reference to the SOLAS Convention is excerpted below (SOLAS, 2004, p. 270):

Chapter V, Regulation 14

4. English shall be used on the bridge as the working language for bridge-to-bridge and bridge-to-shore safety communication as well as for communications on board between the pilot and bridge watchkeeping personnel.

From the study of these regulations, Trenkner and Cole (2010b) find that this regulation covers a wide sphere of English usage, including both bridge-to-bridge and bridge-to-shore communication, onboard communication and communication in ports. The modal verb "shall" used in the above regulations indicates future seafarers to whom this regulation applies has to meet these requirements with no other choice. The SOLAS Convention mentioned in the regulation reinforces the importance of Maritime English.

Among the 26 revisions addressing the requirements of Maritime English that have been made in the STCW Manila Amendments, it is worth noting that the communications both on board and ashore are given higher priority than in the previous versions. "Effective communication" is directly mentioned as a requirement for seven functions, such as "controlling the operation of the ship and care for persons on board at the operational level" (IMO, 2010b, p. 46), "cargo handling and stowage at the management level" (IMO, 2010b, p. 57) and "controlling the operation of the ship and care for persons on board at the management level" (IMO, 2010b, p. 62) and so on Furthermore, some requirements that indirectly refer to or imply the effectiveness of communication are mentioned in the expressions such as "communication is clearly and unambiguously given and received" (IMO, 2010b, p. 62), "ability to understand orders and to communicate with the officer of the watch in matters relevant to watchkeeping duties" (IMO, 2010b, p. 76) and "correct communication procedures are followed at all stages of the search and rescue operation" (IMO, 2010b, p. 51). In this way, much more endeavour in future Maritime English education should be put into the improvement of communication proficiency. To attain better effectiveness of communication, the four basic communication skills of speaking, reading,

listening and writing, which are underestimated in the preceding versions, are now accommodated and highlighted in the corresponding requirements (Fan & Shi, 2012).

2.4.4 The outcomes of Maritime English education in China

As mentioned in the Introduction chapter, the outcomes of Maritime English education in China are not as satisfactory as expected. This section will further examine this issue from the perspectives of maritime students, Maritime English teachers and foreign employers of Chinese seafarers.

Chinese maritime students are weak in the ability to communicate in English with foreigners (Fu, 2008). A recent survey through respondents' self-evaluation shows that Chinese seafarers still lack Maritime English skills, especially their language output skills of English writing and speaking (Fan, 2017). The finding is in alignment with the observation that the pass rates for both written and spoken Maritime English competency exams are very low (Wang et al., 2017; Wu & Cai, 2016).

The majority of Maritime English teachers interviewed in a study showed their great dissatisfaction with their maritime graduates' English proficiency and they agreed that the level of English proficiency of maritime students had seen a year-over-year decrease (Fan et al., 2017a). Some maritime students can hardly speak Maritime English for basic communications despite the fact that great efforts have been put on oral English teaching (Wang et al., 2017).

Foreign employers of Chinese seafarers interviewed in the same survey conducted by Fan et al. (2017a) are far from satisfied with Chinese seafarers' English proficiency which has witnessed a declining trend in recent years. The employers reported that only around 10% of Chinese seafarers could meet the requirement of English proficiency for a seafaring career. English incompetency was regarded as a bottleneck for Chinese seafarers to compete in the international maritime labour market. The English incompetence of Chinese seafarers indicates that the outcomes of Maritime English education are far from satisfactory.

2.4.5 A review of online Maritime English education in China

To provide a full picture of the current status of online Maritime English education in China, a review was done by examining the published studies associated with this topic. The review

attempted to identify the overall status and critical issues in the field of online Maritime English education in China. The publications of this topic are mainly written in two languages: Chinese and English. For Chinese publications, China National Knowledge Infrastructure (CNKI) was selected because it is the largest mainland Chinese full-text database, containing no less than 99% of all the Chinese journals and papers (Zheng & Zheng, 2013). ProQuest, Informit, ERIC, Web of Science and Scopus were chosen as the databases for English articles on account that they are comprehensive and widely used ones covering the majority of journals in social science, arts, and humanities. In addition, International Maritime English Conference (IMEC) has enjoyed a high reputation in the field. The IMEC was established in 2002 and before the establishment of the IMEC, it was called the Workshop on Maritime English (WOME). As an important source of Maritime English research, the previous IMEC proceedings available on the IMEC website (http://www.imla.co/imec/) were searched for this review.

The World Wide Web was introduced in 1992 (Harasim, 2000), so the review covered papers from 1992 to 2018. The same inclusion criterion was applied to the search of both Chinese and English publications, that is, the papers should be related to practical online Maritime English teaching and learning in China. The online library of the University of Tasmania was used to access the databases. Given the fact that the search of keywords alone might lead to the exclusion of potentially relevant studies, this review involved the search of “titles”, “themes” as well as “keywords” of papers in the databases by using several combinations. The search terms include (“Maritime” OR “Marine Engineering” OR “Navigation” AND “English”) AND (“online” OR “e-learning” OR “blended learning” OR “internet” OR “virtual learning” OR “mobile learning” OR “multimedia” OR “flipped class*” OR “MOOC” OR “micro learning” OR “independent learning” OR “digitalisation” OR “informatisation”) AND (“education” OR “teaching” OR “learning”) AND (“China”). In Chinese language, synonyms of one word are not as many as they are in English. Therefore, the search did not use other Chinese synonyms of the above keywords. The search was completed in June 2018.

After screening and selection against the above criteria, a total of 40 articles were assessed as relevant. Among them, 34 articles were papers written in Chinese searched from CNKI, with one master thesis and two published in core journals (In this research, core journals refer to the journals listed in the “List of Core Journals of China” developed by Peking University Library). As for English papers, five relevant articles were found in IMEC proceedings and 1

from the above listed English databases. Chinese researchers were the authors of almost all of the English papers, and only one paper was co-authored with a foreign researcher. Regarding online Maritime English education in China, the earliest article found in CNKI was published in 2001 while the earliest English paper was found in 1999, and the latest ones in Chinese and in English were published in 2017. Figure 2.2 shows distribution of publications on online Maritime English education in China.

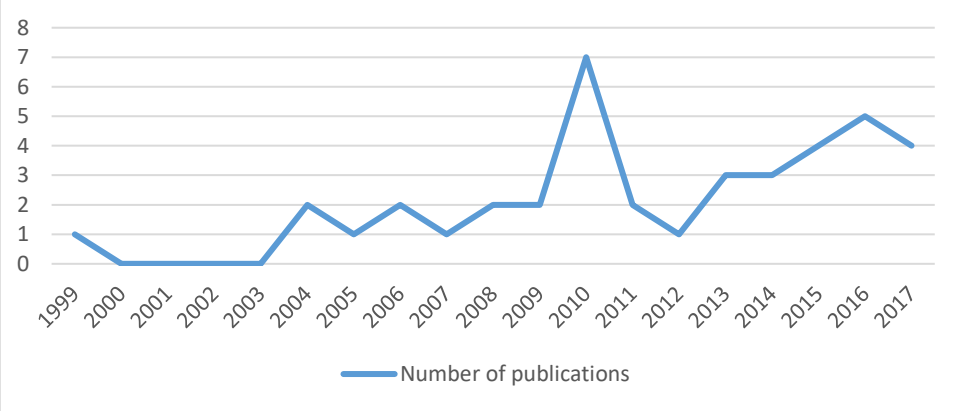

Figure 2. 2. Distribution of publications on online Maritime English education in China

It can be seen from Figure 2.2 that the volume of published literature fluctuated throughout the years. Despite a sharp rise in 2010 when the requirements of Maritime English communications were modified considerably in the STCW Manila Amendments, there was a drop in the following years. However, in spite of the fluctuations, publications were generally on the rise across the years. Since 2010, more papers have been published in this area compared to previous years. The low publication volume before 2003 implies this research topic had not come into most researchers' attention until then. For Chinese papers, except for the master thesis, around 85% of the journal articles were limited to one to three pages in length. The longest article written in Chinese was six pages. Most articles that less than three pages did not have a full and detailed exploration of the research topics. In addition, Chinese papers published in core journals only accounted for a very small proportion (5.88%). Although English papers were normally longer than Chinese ones, which range from three to ten pages, most of the English papers, up to 83.3%, were conference proceedings.

To identify the critical issues in this field, entire papers of the 40 publications were consulted to determine their themes. Through this classification process, the themes of the publications can be grouped into four categories: suggestions or implications for using online tools or

methods (n=16); feasibility or evaluation of online tools or methods (n=10); introduction of online tools or methods (n=8); and the application of online tools or methods (n=6).

Most of the reviewed papers (87.5%) were related to non-empirical studies and only five empirical ones were identified. A closer look at the methodological approaches adopted in the empirical studies revealed that four of them used quantitative methods in the form of questionnaires or tests. Only one study adopted a mixed methods approach. The main data analysis methods were descriptive or inferential statistics. Specifically, Yang (2008) designed a questionnaire to evaluate the strength and limitations of MarEng (a kind of online Maritime English learning resource). Liu and Yu (2016) investigated the possibilities of implementing online Maritime English education by analysing the availability of online devices to maritime students and the length of their everyday online time. They found that most of the Chinese maritime students could access various digital devices and had time to learn Maritime English online. Yan and Hu (2016), Liu (2016) and Weng (2015) conducted surveys to examine the effects of a certain type of online learning tools, such as online learning platform, network corpus and online resources. They all concluded the used online methods enhanced students' learning results and interest.

For the non-empirical research, the majority of the researchers introduced some online methods or resources, such as online software (Zhong, 2010), Maritime English dictionaries and online question banks (Ma, 2010), examined the characteristics of some new online educational forms or technologies, such as online learning platform (Ma, 2008), network corpus (Wang, 2011), P2P (Yuan, 2009), MOOC (Yu, 2017), multimedia (Liu, 2001), micro-course and flipped class (Chen, 2016), analysed their feasibility (Lü & Liu, 2014; Yan, 2015) or possible problems (Song, 2013), and offered some suggestions (Chen, 2009; Zhou, 2012), evaluations (Wang, 2010) or implications (Zhang, 2009) regarding their applications. These articles indicate that online technologies had the potential to be accepted as highly useful tools to improve the quality of Maritime English education. Although many of the published paper provided suggestions (Chen, 2009; Zhou, 2012) or analysed the feasibility (Lü & Liu, 2014; Yan, 2015) of the application of certain online instructional methods, few of them designed a systematic approach to apply such methods or evaluate the effects of such applications. Network corpus and multimedia were two hot topics in this area. Many researchers provided ideas on enhancing the outcomes of Maritime English education by incorporating network corpus (Gu, 2011; Sun, 2006; Wang, 2010, 2011; Zhao, 2012) or

multimedia (Li, 2005; Liu, 2001; Su, 2005; Wang & Wang, 2014) into the teaching and learning process. However, more studies are needed to put these ideas into practice and report the real effects with substantial data or literature support. Generally, there was a lack of quality papers in this area, which implies that the research conducted in online Maritime English education in China is still in its infancy.

The meagre research on online Maritime English in China is contributable to the largely teacher-centred and exam-oriented Maritime English education in China (Shen & Wang, 2011) which is believed to be far from being satisfactory in the maritime labour market (Yan & Pyne, 2013). Such instructional mode may lead to high test scores, but it may undermine the practical English abilities of maritime students. Since a limited number of Chinese maritime students have the ability to fluently communicate English with foreigners (Fu, 2008), the communication issue of Chinese maritime students was highlighted in many papers. In order to address this issue, nine out of the 40 papers discussed the possible ways to improve students' speaking and listening abilities by integrating online methods. Eight other papers dealt with using online methods to facilitate student-centred learning, which shows that their recognition of the importance of placing emphasis on student-centred learning.

The review revealed a dearth of research into online Maritime English education in China. Although there are many courses or resources available online, there is limited access to online Maritime English courses or resources in China where Google, YouTube, and other popular online services are not available for Chinese students because of the internet censorship by the government. The major search engines available in China, such as Baidu, Sogou and Youdao, are better at processing Chinese information (Ursell, 2017) but provide limited access to the information of other languages. Therefore, Chinese learners have few chances to learn from some well-developed online Maritime English resources. Furthermore, few online methods have been implemented in Maritime English education in China. It indicates that online learning develops much slower in Maritime English education in China than it does in the field of general English, even though online learning could be an appropriate approach for Maritime English teaching and learning (Cole & Trenkner, 2012). Many studies in this review were mainly limited to suggestions to apply online methods to Maritime English teaching and learning without empirical evidence. Scant research was performed from learners' perspectives, for example, taking into account their needs and readiness for online learning. Thus, there is a great need for in-depth research into online

Maritime English teaching and learning to accommodate leaner's practical needs and circumstances.

2.4.6 A review of online Maritime English education worldwide

The STCW 2010 emphasises the importance of the competency-oriented approach, which requires further improvements for Maritime English education (Trenkner & Cole, 2012). Accordingly, Maritime English is undergoing a profound reform and innovation worldwide in order to embrace the new or amended requirements set out in the Convention (Fortanet-Gómez & Räisänen, 2008; Ren & Jinren, 2013). To have a comprehensive understanding of the cutting-edge research achievements in this field, it is necessary to review the research of online Maritime English education in the world, which in return could provide implications for the research of online Maritime English education in China.

An electronic literature search was conducted to identify publications that are related to online Maritime English education since 1992 via ProQuest, Scopus, Web of Science, Informit and ERIC. The search was limited to peer-reviewed academic articles to ensure the quality of publications. Basic data searching techniques, like Boolean searching (e.g. and/or/not), nesting, and truncation/wildcard (e.g. */?), were used in the search process. Similar to the previous review, this review searched the "titles", "themes" as well as the "keywords" of papers in the databases by using several combinations. The search themes include ("Maritime" OR "Marine Engineering" OR "Navigation" AND "English") AND ("online" OR "e-learning" OR "blended learning" OR "internet" OR "virtual learning" OR "virtual communit*" OR "mobile learning" OR "multimedia" OR "flipped class*" OR "MOOC" OR "micro learning" OR "independent learning" OR "digitali?ation" OR "informati?ation") AND ("education" OR "teaching" OR "learning"). The synonyms of each theme were used in search rounds. For example, Class* could be class or classroom; digitali?ation could be digitalisation or digitalization; and informati?ation could be informatisation or informatization. Besides the above databases, the review also included the IMEC proceedings available on the IMEC website (http://www.imla.co/imec/). The search was completed in June 2018.

An initial search resulted in 40 articles in Scopus, 37 articles in Web of Science, 33 articles in ProQuest, 13 articles in ERIC and no result in Informit, among which many were overlapped or irrelevant. The titles and abstracts of these articles were read and analysed to determine

their relevance to the review topic. Whenever necessary, entire papers were consulted to determine their themes. After reading, screening, and selection, a total of 13 articles were found to be related to online Maritime English education. In addition, the search of the previous IMEC proceedings found 65 articles related to online Maritime English education in the world excluding China. Figure 2.3 shows distribution of publications on online Maritime English education in the world.

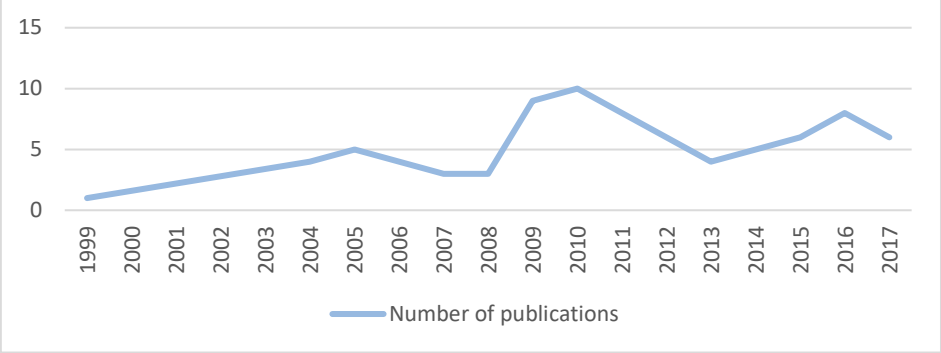

Figure 2. 3. Distribution of publications on online Maritime English education in the world

Figure 2.3 shows a similar pattern as observed in Figure 2.2. Despite the fluctuations, the volume of publications is generally on a modest rise throughout the years. The publication volume of online Maritime English education is relatively low, compared to that of online general English teaching and learning. This phenomenon implies that online Maritime English education has yet been fully explored in most of the countries. The review shows that the majority of the articles were written based on various EU-funded projects related to Maritime English and other articles were mainly from Egypt, Indonesia, and Japan.

It was found from the review that the fast development of online technology and the increasingly integrated use of technology in maritime industry make inroads into MET. Studies find the integration of online methods into Maritime English education may bring different learning results. On the one hand, some studies have supported positive outcomes of Maritime English learning with the aid of technologies. For example, most participants in an online Maritime English course were quite satisfied with their achievement since it increased their motivation, interactions, and responsibility for the learning process (Astratinei, 2014). Cizer and Lungu (2014) found from their research that INTERMAR—a blended custom-designed course, was beneficial in improving students' Intercomprehension (a kind of communication based on mutual comprehension) and Maritime English. On the other hand, there are also concerns about online learning. For instance, the application of the Moodle e-

learning led to a lower level of interaction in class and was overburdened with para-educational tasks for teachers (Pritchard & Tominac, 2009). Generally, the published academic articles related to online Maritime English education worldwide fall into the following four themes: 1) Online Maritime English learning resources; 2) Online Maritime English assessment; 3) Maritime English learning in virtual communities; and 4) Integration of online methods into traditional Maritime English teaching. The following part will discuss these four themes in more detail.

2.4.6.1 Online Maritime English learning resources

Nowadays, the internet becomes an important tool to access and share Maritime English learning resources worldwide (Pritchard, 2004). Online resources are believed to be very useful in Maritime English education for both teachers and students (Lozinska, 2009). Before 2000, Maritime English teaching materials were basically in the traditional print book form with an accompanying CD which may contain the links of some online resources (Cole & Trenkner, 2004). With the development of ICT, various online Maritime English learning resources, testing platforms and projects have been developed and utilised in Maritime English education, such as International Maritime English Language Programme (Kluijven, 2003), Maritime Technical English (Cabrera, 2003), and English for the Maritime Industry (Grice & Rizzi, 2012). In addition, visual dictionaries of maritime terms (Cizer & Lungu, 2016), digitalised textbooks, multimedia materials and software (Pritchard, 2004), have been increasingly used in Maritime English education. The most popular Maritime English online learning resources include (Cole & Trenkner, 2012; Murrell, Nagliati, & Canestri, 2009; SeaTALK, 2014; Ziarati, Ziarati, Sihmantepe, Sernikli, & Acar, 2013):

- Marine Soft's Bridging the difference: based on IMO English model course 3.17 (2004);
- Cambridge University Press' Safe sailing: SMCP training for seafarers;
- MarEng (2004-2007) and MarEng PLUS (2008-2010) (Maritime English Learning Tool);
- The CAPTAINS project (Communication and Practical Training in Applied Nautical Studies) (2010-2012);
- The SeaTALK (a unique online platform for Maritime English resources); and

- Marlins Study Packs (a comprehensive English language training course designed for independent study by seafarers of any rank or nationality).

Based on recorded real cases of communication-related maritime accidents, an advanced online learning platform called the CAPTAINS project was developed to create real-life maritime learning scenarios in order to improve effective Maritime English communication among seafarers (Ziarati, Ziarati, Bigland, & Acar, 2011). The project provided a platform for online communication and virtual collaboration with intensively interactive online learning activities. Furthermore, it enabled learners to self-assess their English communication ability. The participants of the CAPTAINS project considered it useful to practice their English language skills in such an environment (Ziarati & Fang, 2012).

Marlins Study Packs is a comprehensive self-learning and training course with extensive learning materials within authentic maritime contexts (SeaTALK, 2014). From the results of Maritime English teaching with Marlins learning materials, Yihsiang (2008) concluded that teaching with Marlins learning materials could not only provide students with extensive listening and speaking practice in an authentic maritime context, but also enhance students' oral communication performance in the environment of different English accents. In addition, findings from the same study suggested that the basic pronunciation and grammar section of Marlins English could effectively improve students' oral communication ability (Yihsiang, 2008).

The EU-founded MarEng project, complemented with a MarEng Plus project, aimed to improve the Maritime English language competence of professionals (Koivisto, Ziarati, Ziarati, & Acar, 2012; Ziarati et al., 2013). This project provides computer-assisted online language learning tools catering to various levels of learners (de la Maza, 2009). The MarEng learning tool facilitates Maritime English education in authentic maritime situations through multimedia software. MarEng exercise will change the situation of monotonous and mechanical learning which can hardly meet seafarers' needs for communication (Noble, 2007). Furthermore, seafarers can improve their Maritime English knowledge and skills with the MarEng tool in their leisure time aboard or ashore, making the learning of Maritime English more flexible, autonomous and sustainable (Noble, 2007). As opposed to traditional teaching environments, the MarEng within CAL environments can provide online learners with immediate and interactive feedback and take a tutor role in the absence of a teacher (Noble, 2007). The MarEng project, however, excludes the learning of speaking skills

because computers still have limitations in promoting speech. Although many maritime students found it entertaining and intriguing, de la Maza (2009) highlighted some drawbacks of this tool: 1) students tend to rush through the various online resources without a focused attention; 2) a great lack of English proficiency presents a challenge to make full use of online learning activities; and 3) the unfamiliarity with multimedia technology also undermines teaching efficiency.

There are IMO model courses that help enhance, update or supplement existing training materials in order to ensure the fulfillment of STCW Code by member states (IMO, 2018). The recent revision of the Model Course 3.17 for Maritime English has produced an updated syllabus and provided a revised database of resources, introducing a variety of online resources to the curriculum (Noble, Şihmantepe, & Ziarati, 2014). These are expected to promote the dissemination of Maritime English learning and teaching resources in the field of Maritime English at an international level.

2.4.6.2 Online Maritime English assessments

In recent language testing practice, computer-based exams have gained increasing predominance in Maritime English education because it is more feasible to test communicative ability in authentic and realistic situations, which makes the test more effective (Pritchard, Cole, & Trenkner, 2013). Some current well-recognised Maritime English online testing resources include (IMETS, 2018; Takagi, Uchida, & Coyle, 2004; Toncheva, Zlateva, & Ziarati, 2012; Ziarati et al., 2011):

- MarTEL (Maritime Test for English Language);
- Marlins tests (an online assessment of seafarers' understanding of both written and spoken English);
- MarineSoft TOME (Test of Maritime English);
- TOMEC (Test of Maritime English Competence); and
- IMETS (International Maritime English Testing System).

Although the abovementioned tests have made their contributions to improving the quality of Maritime English tests, up till now, there are no consensus on standards for measuring English competence in this field (Albayrak & Ziarati, 2009). Since seafaring is a globalised profession, an internationally recognised or IMO approved Maritime English exam is

required to qualify the seafarers from all the countries (Chen, 2011b). Pritchard et al. (2013) found that current computer-based tests (CBT) for Maritime English have a large proportion of selected responses, especially multiple-choices, thus, putting more emphasis on linguistic or technical knowledge than on communicative techniques.

Whereas MarTEL, Marlins tests and TOMEC exhibit high reliability and validity in testing communicative skills, there is not yet an efficient online Maritime English speaking test (Pritchard et al., 2013). IMETS, which is designed to assess a candidate's overall oral communicative efficiency in maritime settings, can probably be a supplement. It is conducted in the form of a one-to-one interview between the candidate and the examiner under secure test conditions (IMETS, 2018). However, it is a test of plain English in a maritime context and it is not a test of SMCP (Standard Marine Communication Phrases).

2.4.6.3 Maritime English learning in virtual communities

A virtual community is a cyberspace used by a group of frequent visitors to regularly communicate with each other through online methods (Chen & Hung, 2010). Wellman (2001) concluded from his research that virtual communities could facilitate social interaction and information sharing within a group, develop users' problem-solving ability through real-life practices and nurture a sense of belonging and social identity among the regular users. Virtual communities are beneficial for maritime students or seafarers to familiarise themselves with various English language usages and cultures.

Although some Maritime English virtual communities can be found in various social media, such as Facebook, WeChat, Weibo, and Blog, research has not fully explored this area. Only two published peer-reviewed papers were found related to this topic. Specifically, Aung and Zeya (2012) explored the feasibility of constructing a virtual community to support the MET programme. It is found that the virtual community constructed by the CMS DotNetNuke not only improved the outcomes of students' education and training but also resulted in the increase of job opportunities both nationally and internationally. The MET programme supported by the virtual community had achieved the required development of professional skills. In addition, Valle (2011) found that most maritime students in a class agreed that they had benefitted from collaborative work of creating a Maritime English Glossary in a virtual environment through selecting terms, entering definitions, providing translations and adding

pictures. It indicates that collaborative work within a virtual community can contribute to the successful learning of Maritime English.

2.4.6.4 Integration of online methods into traditional Maritime English teaching

During the last decade, higher education has shown an apparently increasing trend in combining face-to-face classroom activities and online learning methods, which is commonly known as blended learning (Strayer, 2012). A blended learning environment maximises learning outcomes by combining synchronous and asynchronous modes of learning (Iakovaki, 2011). Blended learning approach can help engage learners in communication amongst the class participants, creating opportunities for students to access teaching materials before and after class (Wet, 2013).

Maritime students are more willing to learn English individually or collaboratively in a virtual environment and the internet is believed to be the most popular Maritime English learning tool in the future if not yet (Cole & Trenkner, 2012). In order to facilitate the integration of online technology into Maritime English education, various online tools can be adopted in Maritime English learning and teaching, such as the internet-based tool of Doodling which proves to be helpful in learning new concepts or vocabulary of Maritime English through a digital pathway (Apostol-Mates & Barbu, 2016b), the Hypertext Use which digitalises Maritime English Teaching (Bezhanovi, Khardina, & Zarbazoia, 2015), and the trainer-guided learning courseware of FlexiMod which can be used both in and out of class for distance learning or self-study via the internet (Meinhardt & Glasel, 2005). It is agreed that a blended learning environment integrating online and conventional classroom learnings would be the optimum solution for maximising the learning outcomes (Iakovaki, 2011).

Although blended learning is still in its infancy in Maritime English education, this approach has come into the attention of Maritime English scholars. The competence-oriented Maritime English education under STCW 2010 requires a communicative approach as the main methodology (Pritchard et al., 2013). Blended learning appears to be a suitable approach for achieving the requirement of “effective communication” as amended in STCW 2010 (Cole & Trenkner, 2012). First, no uniform teaching method can meet the needs of all maritime students with varied English levels and educational backgrounds. Second, blended learning mode can cater to the learning habits and preferences of millennial students who are living with the electronic devices and the internet (Wet, 2013).

Research has indicated that when a blended learning approach is well planned and properly implemented by Maritime English teachers, it can significantly improve students' learning experiences (Wet, 2013), such as increased student engagement, learning support, learning flexibility, learning autonomy and learning collaboration in a less stressful learning environment (Marsh, 2012). Empirical evidence also shows that blended learning has been successfully applied to Maritime English basic courses. In blended learning, much more hands-on communication practices have been conducted in class and students' oral English ability has been substantially improved (Ferreira, 2014).

A flipped classroom, sometimes called an inverted classroom, shares great similarity with blended learning. It is a pedagogical mode where instructors flip the traditional lecture-in-class, study-at-home learning mode (Mellefont & Fei, 2014). The instructor-centred traditional mode usually assigns precious class time to lectures, which results in passive in-class learning (Gannod, Burge, & Helmick, 2008). The flipped classroom, which requires students to view lectures online before class and allocates in-class time to do exercises, projects, or interactions, turns the class into a workshop or tutorial (Fei, Caesar, Chin, & Mather, 2014). In this way, instructors of flipped classrooms act as coaches or advisors who focus on hands-on activities (EDUCAUSE, 2012). In Maritime English education, Flipping Maritime English Basics course has provided satisfactory results albeit some constraints involved, such as time cost, high drop-out rate, and additional efforts needed to monitor students' progress (Ferreira, 2014).

Multimedia technology helps to create an authentic language situation in a virtual environment. The increasing popularity of the socio-cognitive view of communicative teaching results in project-based, task-based, and content-based communicative approaches, making inroads into Maritime English teaching where various language skills should be learned and used in authentic environments (Cole & Trenkner, 2012). There are some studies exploring the effects of adopting multimedia in Maritime English education. For example, Youssef and Taher (2005) concluded that online simulations of real situations could familiarise students with communication on board, such as VHF (Very High Frequency) and VTS (Vessel Traffic Services) communications at sea. Wet (2013) found that online video lectures were particularly beneficial to students with a low language level and those who are unable to attend the classroom on a regular basis. A survey conducted by Jurkovič (2013) shows that using authentic videos in the classroom can increase maritime students'

motivation and self-confidence, and relieve language learning anxiety. Eighty-two percent of maritime students surveyed preferred learning with videos to the traditional classroom teaching and believed vocabulary, pronunciation, and terminology could be well acquired through watching videos (Jurkovič, 2013). Agasta, Priadi, and Kusumaningrum (2017) found that maritime students were more interested in using video materials to learn Maritime English since they could provide a real picture of the situation on board. Watching videos in the classroom may also guide them to seek and obtain other relevant videos available online for learning purposes (Kuppens, 2010).

The review shows that the applications of online methods in Maritime English education are still scarce despite the availability of online Maritime English learning resources. The limited research also lacked variation and differentiation as far as pedagogical innovation is concerned. However, a general agreement of belief among Maritime English practitioners is that online technology motivates and facilitates learning in terms of providing learning opportunities in a virtually authentic environment and encouraging learner autonomy and lifelong learning (Valle & de la Campa Portela, 2011).

2.5 Summary

This chapter has explored the literature in relation to online learning, online ESP learning, and Maritime English education. In the section of online learning, it has first reviewed the terms related to online learning from technological and pedagogical perspectives respectively. Then it has reviewed the barrier to implementing online learning from organizational, personal and technical perspectives. This review has probed the status and needs of online learning by referring to the framework of QM. Readiness factors have also been discussed in this section. With a reference to the previous literature, this study has explored the readiness of online Maritime English education in China from four dimensions: Self-efficacy of online learning, Self-management of learning, Technology, and Support.

The literature review of ESP learning has found that instead of equally emphasising the four basic language skills, ESP focuses on specific language skills which are determined by needs analysis. It is different from GE in terms of characteristics, teaching aims, and target learners. Different learning theories are suitable for learners with different learning purposes. In practice, behaviourism, cognitivism and constructivism are three influential learning theories facilitate online ESP learning. Most of the studies conducted on the integration of ICT into

ESP education concluded online methods could effectively improve the outcomes of ESP learning.

The last part of this chapter has reviewed four important aspects of Maritime English: its domain, a subset of ESP, its current requirements regulated by IMO, and the outcomes of Maritime English education in China. Two general reviews were conducted about online Maritime English education in China and abroad respectively. One review has revealed there is a dearth of research on online Maritime English education in China. The research on online Maritime English education in China lacks empirical evidence and is mainly limited to providing suggestions on applying online methods to Maritime English teaching and learning. Few studies are performed from learners' perspectives with empirical evidence. The other review has shown although the fast development of ICT has made inroads into Maritime English education, the applications of online methods in this field are still scarce in the world. Empirical evidence has proved the positive outcomes of online Maritime English learning. With the increasing demand for seafarers' communication ability, much research is still needed to be done in this field.

The next chapter looks into the methodology involved in this study. Research approach and research design, data gathering and analysis methods are discussed, followed by the reliability and validity of the study. Ethical considerations are also presented in the next chapter.

Chapter 3 Methodology

3.1 Introduction

Chapter Two reviews three aspects related to this research: 1) online learning; 2) ESP learning; and 3) Maritime English education. Especially, it reviews the literature of online Maritime English education in China and abroad. After providing the theoretical foundation for this research in Chapter Two, the researcher presents and justifies the decisions made in relation to the methodology of this research in Chapter Three. It first explains the research approach which is underpinned by a mixed methods approach. Then it describes the research design of this study, including design strategies, research instruments, and samplings. This chapter later explores the process of data collection and data analysis. Finally, this chapter looks into issues of reliability, validity and ethical considerations of this research.

3.2 Research approach

Quantitative and qualitative approaches are two main streams of research paradigm (Teddlie & Tashakkori, 2009). They have been traditionally regarded as incompatible by some social science researchers (Buchanan, 1992). When describing their differences, Denzin and Lincoln (2000) highlight that quantitative studies focus on the exploration of the relationships between variables rather than processes while qualitative research emphasises processes and meanings. Quantitative research approach uses statistical procedures to seek norms of a social problem deductively. In contrast, qualitative research approach explores underlying reasons by analysing data inductively (Creswell, 2013b). Deductive approach allows one to test an existing theory while inductive approach enables the generation of a new theory by analysing the data one has collected (Saunders et al., 2011). Quantitative data collection usually uses questionnaires that are mainly composed of closed-ended questions whereas qualitative data tends to be collected through interviews with open-ended questions (Steckler, McLeroy, Goodman, Bird, & McCormick, 1992). Quantitative research approach mainly analyses numerical data while qualitative research approach generally handles none-numerical data (Cohen, 1988). In addition, there is a major difference between the two research approaches as to the role of the researcher. In quantitative research, the researcher tries to be an objective observer and remain detached, while in qualitative research, the investigator needs to be

keenly interested in what they are observing (Charles, 1998) and use interview techniques to control the conversation (Miller & Rollnick, 2013).

However, some scholars believe that combining different approaches enables us to understand mutually complementary aspects of a theme (Glesne & Peshkin, 1992; Johnson & Onwuegbuzie, 2004). The quantitative and qualitative research approaches are not distinct but complementary to each other. As a third research paradigm, a mixed methods approach, which incorporates both quantitative and qualitative methods, can draw on the strengths of both, while minimising their disadvantages to provide comprehensive insights into the researched issues (Bryman, 2006; Johnson & Turner, 2002). A combination of quantitative and quality approaches can make the results more holistic and convincing (Saunders et al., 2011).

A mixed methods approach was appropriate to investigate and understand the complex social phenomenon (Nilsen & Purao, 2005) that this research endeavoured to study. The research objectives of this study imply that a mixed methods approach would be appropriate in addressing the research questions. To have a comprehensive portrait of the research topic, the researcher not only needs to know the in-depth thoughts of the participants, but also should have a general picture of the related issues which would be guaranteed by the participation of a certain amount of the target population (no less than the recommended sample size which is discussed in Section 3.3.3.2). Therefore, both numerical and narrative data are beneficial in exploring the topic of this research because numerical data could be used to analyse the general picture of the research issues whereas in-depth information would appear through analysing the narratives. Quantitative research method was applied to gather, analyse, interpret and present numerical information while a qualitative research method was involved in dealing with narrative information (Teddlie & Tashakkori, 2009). By utilising a mixed methods approach, the results of this research were more likely to offset the weakness of using only one research paradigm. To this end, a mixed methods approach was employed to collect and analyse data in this study.

3.3 Research design

3.3.1 Research design strategies

The research design is a basic plan for carrying out a project or a study, involving the selection of appropriate strategies for data collection, data measurement, and data analysis (Punch, 2013). Research design can be divided into quantitative and qualitative research designs (Creswell, 2013b). In view of the mixed methods approach of this research, a mixed methods design strategy was appropriate to achieve the aim and provide a more comprehensive understanding of this study (Creswell, 2013b). A combination of the two methods is appropriate to gather information from different perspectives of the participants, which would be more holistic and convincing than by utilising only one method (Teddlie & Tashakkori, 2009).

Quantitative research design mainly includes experimental, quasi-experimental and non-experimental designs (Punch, 2013). According to Lobmeier (2010), in experimental designs, the researcher manipulates variables and research participants are randomly assigned to groups. In quasi-experimental designs, although the groups already exist, the researcher still manipulates the value of the variables. In non-experimental research design, variables are not manipulated, and the participants cannot be randomly assigned to groups. The justifications for research design should be based on research objectives, research questions and the research approaches. Since this research endeavours to identify Chinese maritime students' and Maritime English teachers' opinions, the groups already existed before the research and the researcher would not have manipulated the variables. Therefore, non-experimental design is chosen for this research.

While questionnaires are appropriate for gathering general information from a large sample of people (Leung, 2001), this research also needs in-depth information on the related issues. Hence, qualitative research is employed together with quantitative research to fully explore the topic. The most common sources of qualitative data are documents, interviews, and observations (Suter, 2012). Interviews are applied when the researcher needs to collect intensive and detailed information on the research topic from the perspectives of a small number of participants (Creswell, 2013a). It allows direct communications with the respondents to explore a topic in more detail, which can be complementary to the general data gathered from indirect communications of questionnaires (Boyce & Neale, 2006; Gill et al., 2008). This research needs firsthand information from Chinese Maritime English teachers and maritime students. Therefore, in this study, interviews were designed to glean the qualitative data.

In mixed methods research, quantitative and qualitative methods are used either sequentially or concurrently, corresponding to sequential mixed methods design and convergent parallel mixed methods design respectively (Creswell, 2013b). In this research, quantitative method and qualitative method were used to complement each other in explaining the results. The designs and data analysis for both questionnaires and interviews were quite independent. Therefore, the convergent parallel mixed methods design was adopted for this study, i.e., the questionnaires and interviews were carried out at the same time. After data analysis, the results of both questionnaires and interviews were used complementarily to answer the research questions. This research combined quantitative and qualitative research methods, and used both teachers and students as data sources, to explore a more complete understanding of the research topic. The use of multiple methods of data collection in this study is a form of triangulated research strategy, which can strengthen both reliability and validity of this research (Merrian, 1998).

3.3.2 Research instruments

Questionnaires provide an objective method to gather information about respondents' views (Sapsford, 2006). They are suitable for the quantitative research of this study because, as suggested by Saunders et al. (2011), they can efficiently collect responses from a large sample for quantitative analysis. According to McLeod (2018), using a series of questions is efficient in collecting the generic information gathered from the target population. Furthermore, by using questionnaires, large amounts of data can be gathered in a relatively shorter time (McLeod, 2018). In this way, questionnaires were employed as a research instrument to collect quantitative data. The questionnaire items were developed based on the literature review to address the research objectives and answer the research questions. Most of the questionnaire questions were close-ended. However, an open-ended question was included at the end of the questionnaires to enable the respondents to further express their views relevant to the researched questions, if any. Except for the questions in the biographical section and the open-ended question, the questionnaire items used five-point Likert scales to assess the respondents' attitudes towards online Maritime English education in China since Likert scale is easy to be understood by the respondents and its data are relatively easy to be analysed (LaMarca, 2011).

There are many types of questionnaires. Regarding how it is administered, it has two major types: self-administered (mail, online, or delivery and collection) and interviewer

administered (structured interview or telephone questionnaire) (Saunders et al., 2011). The selection of questionnaire type is decided by many factors, such as research objectives, research questions, available resources, size of the sample, characteristics of the respondents, and available time and finance (Saunders et al., 2011). Taking into account the finance and time constrains of this research, online questionnaire was adopted as the main means to obtain the quantitative data for this research. There are some advantages in using online questionnaire. First, the cost of conducting online questionnaire is low, compared to other forms of conducting questionnaire, such as mail or phone. The questionnaires of this research were posted on the free survey website QuestionPro. There was no other expenditure except the fees for internet operation. Second, with the growing access to the internet, online questionnaire has a wide coverage and is time-efficient (Regmi, Waithaka, Paudyal, Simkhada, & Teijlingen, 2016). Third, online questionnaire can be conducted anonymously, which will guarantee more reliable information (Wimmer & Dominick, 1983).

Interview is particularly useful for exploring in-depth information about the research topic (McNamara, 2006). Hence, for the qualitative research of this study, interview was employed to collect qualitative information. Interviews can be structured, unstructured and semi-structured (Cachia & Millward, 2011). Structured interviews comprise a predetermined set of questions with an opportunity for live interactions between an interviewer and an interviewee. Unstructured interviews, on the other hand, have no pre-set questions but explore the issues as the interview process unfolds. Semi-structured interviews share the features of both structured and unstructured interviews, including some predetermined questions and additional questions. In semi-structured interviews, the researcher may not necessarily follow the order of predetermined questions depending on the flow of the conversation and additional questions can be asked if any (Irvine, Drew, & Sainsbury, 2013). Interviewees can answer questions from the interviewers as well as freely express themselves (Cohen & Crabtree, 2006). Semi-structured interviews generally tend to probe an in-depth understanding of research questions from a small number of participants with a few questions (Cataldo & Kielmann, 2016). Open-ended questions are asked during interviews because they may provide rich information and insight into the responses (Hair, Celsi, Money, Samouel, & Page, 2015). In this study, although the research questions were addressed in the prepared interview questions, the respondents were able to express their ideas related to the research topic in a flexible way that did not constrain the discussion to the research questions as expressed in the schedule. The relatively focused, conversational and two-way

communications of semi-structured interviews give flexibility to both the researcher and the participants to probe interesting points when needed while securing the research objectives (Keller & Conradin, 2019). Therefore, semi-structured interviews were conducted for this research so that the researcher had control over the topics of the interview while a flexible range of responses to each question was possible. Table 3.1 presents how the four research objectives were addressed in the questionnaire sections and interview questions.

Table 3. 1. *Alignment among research objectives, questionnaire sections, and interview questions*

	Questionnaires	**Interviews**
Objective 1	Section B (22 questions)	Q1
Objective 2	Section C (18 questions)	Q2
Objective 3	Section D (14 questions)	Q3
Objective 4	Open-ended section (1 question)	Q4

For this research, the questionnaires and interviews were originally developed in English. However, the actual data collection occurred in China where most of the target population were not comfortable or unable to use English fluently. In order to ensure valid responses, the English questions were translated into Chinese. It is vitally important that the Chinese translation of the instrument is equivalent to the originally developed English version (Cavana, Delahaye, & Sekaran, 2001). The translation process included activities such as pre-tests, forward and backward translations, comparisons and modifications. Pre-test is designed to ensure the appropriateness, clarity and adequacy of the research instruments and improve the reliability and validity of the data to be collected (Saunders et al., 2011). Two pre-tests were carried out in this research for the English and Chinese versions respectively. Academic and maritime professionals were invited to take part in the pre-tests and provide feedback. The pre-tests involved ten doctorate candidates, five academic staff, two maritime experts, three Maritime English teachers and two maritime students. They contributed both in terms of academic rigour and the wording of questions. Modifications were made based on the comments from the pre-tests. Forward and backward translation was also adopted to ensure equivalence, as suggested by Hambleton and Lee (2013). In this research, forward and backward translation was carried out by two bilingual researchers in this research area. After forward and backward translation, two English versions of the instrument were compared to identify any inconsistencies. Some modifications were made to ensure two versions are equivalent regarding meaning and appropriateness.

3.3.3 Sampling

3.3.3.1 Sampling methods

Before choosing the appropriate sampling methods for the research, the researcher needed to define the target population first (Kitchenham & Pfleeger, 2002). The participants of this research were those who were involved in and familiar with Maritime English education in China. Therefore, the target population of this research was current maritime students and Maritime English teachers from various MET institutions in China. The number of enrolled Chinese maritime students is around 50,000 (MOT, 2018). In China, the class size in higher education normally ranges from 45 to 81 students (OECD, 2017; Yao & Yang, 2012). One Maritime English teacher is generally responsible for at least one class. According to this ratio, the number of Maritime English teachers in China approximately ranges from 615 to 1104. Actually, the real number of Maritime English teachers in China is lower than this range because normally one Maritime English teacher is responsible for more than one class.

Choosing appropriate sampling methods is directly related to the quality of the collected data (Hesse-Biber & Leavy, 2010). To best select the representative sample for this research, different sampling methods were employed for quantitative and qualitative data collections. The sampling for the quantitative data collection was purposive random sampling, which involves a random sample of a purposively selected group (Teddlie & Yu, 2007). The purposively selected group here was the target population of this research. Random selection ensures the representativeness and generalisability of the data (Teddlie & Yu, 2007). In this case, to avoid possible sampling bias, every individual in the target population was offered an equal chance to be selected. The advertisements and posters of the questionnaires were provided to all the potential participants without bias.

The sampling for qualitative data collection was stratified random sampling. Stratified random sampling is a combination of random sampling and stratified sampling (Teddlie & Yu, 2007). It first divides the entire target population into different subgroups, and then samples are randomly selected by a final list of subjects proportionally from each subgroup (Nickolas, 2015). The subgroups were divided according to the different geographical locations and educational tiers of the MET institutions. In the MET institutions which permitted the interview, the potential participants were given the same chance of receiving the invitation letter. This type of sampling was used because the researcher wanted to explore

the same topic from the different perspectives of specific subgroups in the target population and to ensure the representativeness of the samples in various subgroups (Teddlie & Yu, 2007). The detailed selection process was described in Section 3.3.3.3.

3.3.3.2 Sample size

On account of the large number and wide dispersion of the potential respondents, it was impossible to survey all of them for this research. Some representative individuals, groups or organisations should be chosen instead of collecting information from all the potential participants (Chromy, 2006). Therefore, a recommended sample size was set for this research in the first place. In quantitative research, Maritime English teachers and maritime students were regarded as one group, that is, the calculated sample size was the recommended sum of the participating students and teachers. There were two reasons for doing this. First, regarding the number of Maritime English teachers, a separate quantitative analysis of Maritime English teachers would require a sample of 200-300 participants, which accounted for nearly half of all the current Maritime English teachers in China according to the number calculated in Section 3.3.3.1. It was not possible to recruit a sample of this size for this research because of the limited timeframe and budget. Second, the questionnaire questions were mainly aimed to examine maritime students' experience of online Maritime English education in China. Maritime students' experience of online Maritime English learning was also viewed by their Maritime English teachers. Therefore, regarding them as one group was practical and reasonable.

There are a lot of ways to calculate sample size. One of them is using the following equation:

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1+(\frac{z^2 \times p(1-p)}{e^2 N})}$$

Population Size = N; Margin of error = e; z-score = z; P= Standard Deviation

(SurveyMonkey, 2016)

Normally, e=5% and Confidence Level=95% are acceptable in statistics because 95% confidence level indicates that 19 out of 20 times the results would land within the margin of error and 5% margin of error states that the results from 1000 respondents could differ with a score of 5% from its original score (Hunter, 2012). The value of z is 1.96 when the

Confidence Level is 95% (SurveyMonkey, 2016). The safe decision for the standard deviation is 0.5. When applying such values into the above formula, the sample size is 382. However, in some scholars' opinion, in most cases, at least 100 responses are needed for a minimum acceptable accuracy and 200 responses can provide sufficient accuracy under most assumptions and parameters for a study (Bennekom, 2003). Therefore, the range of the sample size for this research was expected to be around 200-300.

With regard to interviews, there are also different measurements around the sampling. Kuzel (1992) proposes that 6 to 8 interviews are appropriate to a homogeneous sample. Guest, Bunce, and Johnson (2006) suggest that 12 in-depth interviews should suffice for a homogenous group. Bertaux (1981) believes that 15 is the minimum acceptable sample number in qualitative research. Saunders et al. (2011) recommend that 25 to 30 interviews should be sufficient for a general study. With a comprehensive consideration of the abovementioned recommendations, the total number of interviewees for this research would be 24. The researcher would select 12 students and 12 Maritime English teachers for the qualitative study to gain a deeper and more comprehensive understanding of their perceptions towards online Maritime English education in China.

3.3.3.3 Recruitment

In this research, the participants were invited from the lists of MET institutions that were available at the website of the Ministry of Transport of the People's Republic of China. Considering the fact that the target population may come from various MET institutions located in different parts of China, it is feasible and economical to conduct the questionnaires through online forms (Hewson, Yule, Laurent, & Vogel, 2003). For questionnaires, advertising widely via a range of media with a statement of research purposes is recommended (Witmer, Colman, & Katzman, 1999). An information sheet with a description of the research project as well as the investigators' contact details was provided to all the potential participants through a link in the advertisement. Advertisements and posters of the questionnaires were used in permissible and appropriate places, such as public areas of popular websites for maritime students and Maritime English teachers. Advertisements were also circulated in the discussion areas of the campus website or Bulletin Board System (BBS) of the campus networks of the MET institutions.

A web link to the information sheet and questionnaires was provided in the advertisement. Consent of participation in the questionnaires was obtained and confirmed before the start of the questionnaires by clicking on a box indicating consent:

☐If you agree to participate, please tick the box and continue with the questionnaire

To recruit interview participants, this research first grouped the MET institutions according to their geographical locations and educational tiers. In each group, the researcher randomly selected two MET institutions from the official list available at the website of the Ministry of Transport of the People's Republic of China. Then the researcher contacted the administration staff of these institutions (e.g. director or manager) using the contact information provided on their websites. This initial contact was made either by phone or email, depending on the contact information that was provided. If permission for carrying out the interview was obtained from the management board, then the related staff was asked to send an invitation email together with the information sheet to all the maritime students and Maritime English teachers. If the potential participants were interested in participating in the interview, a consent form was then provided to them by email or mail before the interview. Their signed consent form could be sent back to the researcher either by mail or email or collected at the interview. Then an interview was planned to be carried out. If the number of respondents had not reached the sample size, another round of random selection would be applied to recruit more participants.

3.4 Data collection

3.4.1 Participants

A total of 289 volunteers participated in this research, including 255 maritime students and 34 Maritime English teachers, who were currently learning or teaching Maritime English in MET institutions in China. The questionnaires involved the participation of 243 maritime students and 22 Maritime English teachers. Among them, 10 completed questionnaires (9 maritime students and 1 Maritime English teacher) missed more than 50% of data. Therefore, these questionnaires were excluded from data analysis. The remaining 255 responses, including 234 responses from maritime students and 21 from Maritime English teachers, were used for quantitative data analysis. The interviews recruited 24 participants, including 12 maritime students and 12 Maritime English teachers. The number of participants of both

questionnaires and interviews has reached the recommended sample size which is analysed in Section 3.3.3.2.

3.4.2 Quantitative data collection

The questionnaires in this research were used to investigate the participants' general views toward online Maritime English education. Since online instructions have a tendency to be student-centred (Keramati et al., 2011) and the student factor is the most important factor influencing the satisfaction of online learning (Bolliger & Wasilik, 2009), the questions were designed to examine students' experience of online Maritime English education. These questions were answered from the perspectives of maritime students as well as Maritime English teachers. The teachers offered their opinions on their maritime students' experience regarding online Maritime English education in China, such as students' self-learning and self-management ability, as a cross-reference of students' answers.

There were five parts in the questionnaires: one biographic information part, three scaled parts to investigate the issues related to the research topic and one open-ended question part to enable participants to freely express their suggestions for online Maritime English education in China. The first part of the questionnaires was composed of questions on respondents' biographic information, such as students' educational qualification, students' major, students' grade, dominant teaching mode, the employment of online learning platform, students' Maritime English ability, online experience and class size. In this part, multiple choices were employed to gather respondents' background information. The three scaled sections were designed to investigate the current status of, the practical needs and readiness for, online Maritime English education in China. The second to the fourth part adopted five-point Likert scale to evaluate the respondents' attitudes. The questions on the current status of online Maritime English education were adapted from the QM Rubric Standards which is widely adopted to improve and assure quality in the structure of online courses (Adair & Shattuck, 2015). The scaled questions on the needs for online Maritime English education were based on the principles of ESP needs analysis (Hutchinson & Waters, 1987). The last scaled section, which was related to readiness for online Maritime English education, was developed from several research achievements in the realm of online readiness, such as McVay's 13-item Readiness (McVay, 2000, 2001), Smith's confirmation of McVay's instrument (Smith, 2005), Bandura's research in self-efficacy (Bandura, 1997) and Dray's

validation of online readiness framework (Dray et al., 2011). The open-ended section enabled the researcher to further explore the participants' views on the themes of this study.

The questionnaires were completed and collected online. The participants were provided with a link to the information sheet and instructions about how to complete and submit the questionnaires before they began to answer the questions. When the participants finished the questionnaires and clicked on the "Done" button, their answers to the questionnaires were automatically stored in the QuestionPro website. The whole process would take the participants approximately 45 minutes.

3.4.3 Qualitative data collection

The semi-structured interviews contained two sets of four open-ended questions for maritime students and Maritime English teachers respectively. The questions were designed to explore the aspects that the questionnaires did not cover or gain a richer and deeper understanding of the research themes from the participants' views. Different from quantitative data collection, maritime student and Maritime English teacher were regarded as two groups here. The interview questions intended to obtain information both from students' and teachers' perspectives because in order to have a holistic understanding of the research topic, it is necessary to know teachers' opinions on some issues, such as the current needs and problem of online Maritime English education. It took about 40 minutes to complete the interviews.

The semi-structured interviews of this research were conducted either in a face-to-face setting, online or over the phone to provide richer information into the issues related to online Maritime English education. Three face-to-face and two telephone and seven online interviews were conducted at the interviewees' convenience. The interview conversations were either recorded by digital devices or written in a notepad with the interviewees' permission. After the interviews, such information was transcribed into textual data for further analysis.

To reduce the potential effects from the outside factors, such as the interviewer's behaviour, unintended interruptions and other distractions, the researcher incorporated some techniques into the interview. For instance, the researcher tried to behave in the same way under all interview conditions (Fontana & Frey, 2003); the interviews were conducted with no presence of a third party (Neuman, 2012); and interruption was avoided when the participants were talking and thinking (Babbie, 2013).

3.5 Data analysis

3.5.1 Quantitative data analysis

The collected quantitative data can be classified into two types: categorical data and numerical data. Both data types should be numerically coded to enable efficient data analysis (Saunders et al., 2011). On account that the software SPSS is powerful in dealing with numerical data (Pallant, 2016), SPSS Version 23 was adopted as the quantitative statistical analysis tool to explore the numerical data and relationships among the variables.

The analysis of quantitative data from this research was divided into several stages. First, a codebook was created, that is, the data obtained from the questionnaires were converted into a format that was readable for SPSS (Pallant, 2016). All gathered responses to the questions were tallied and assigned a unique code. Written responses to the open-ended question were recorded in another separated worksheet. Second, the researcher established a data file, corrected and screened possible data errors. Third, certain weights were assigned to the variable attributes (Neuman, 2012). After these preparations, then, data were explored through various statistical techniques (Pallant, 2016).

Several different statistical methods were applied to analyse quantitative results. Descriptive statistical methods were conducted to obtain the general information of the responses. Frequency, percentage, and median values were used for a descriptive data analysis. EFA was performed to calculate the coefficients of every factor (DeCoster, 1998). Factors with coefficients below 0.30 and those cross-loaded with less than 0.20 difference between factors were considered to be deleted (Chen & Willits, 1998). The items of the questionnaires were refined by EFA. Cronbach's Alpha coefficients were used to check the internal reliability of the questionnaire items. Structural Equation Modelling (SEM) is regarded as one of the most popular statistical methodologies that can be applied to quantitative social science (Kaplan, 2001). SEM combines path analysis which originated from biometrics and factor analysis which originated in psychometrics (Fan, Chen, et al., 2016). Kruskal-Wallis test was adopted to find the factors that might be influential to other responses (Pallant, 2016). After Kruskal-Wallis test, a follow-up Mann-Whitney U test was applied, as suggested by Pallant (2016), to compare the differences between two independent groups. Finally, Spearman Rank Order Correlation (rho) was used to test the negative or positive relationship and an indication of

the degree of strength between groups of continuous variables (Pallant, 2016). The detailed quantitative data analysis will be presented in Chapter 4.

3.5.2 Qualitative data analysis

The data collected from the semi-structured interviews were in a textual form. The software NVivo was utilised in this study to transcribe, interpret and organise the data collected from the interviews because it provides organised and efficient ways for analysing qualitative data (Jones, 2007). It supports the information from various records, such as text, video, audio, photograph and web pages (Bazeley & Jackson, 2013). In alignment with the suggestion made by Saunders et al. (2011), chunks or units of data were categorised and coded according to the relationships between variables.

The foundation of the qualitative data analysis was thematic analysis. Thematic analysis does not try to develop a new theory to describe the findings (Braun & Clarke, 2006). Thematic analysis uses a cluster of methods to summarise datasets into themes for later explanation (Ryan & Bernard, 2000). It enables researchers to use various types of information systematically and is therefore very useful in synthesising data from different sources (Boyatzis, 1998). The process of thematic analysis starts with identifying the emerging themes from respondents' interview accounts. Once these initial themes have been identified, the next step is to group all the data that are related to these themes, produce codes and refine the themes (Aronson, 1995). The task of thematic analysis is to find the explanation of each pattern, code, and theme from all perspectives (Braun & Clarke, 2006). The three-step coding process was applied to thematic analysis since the process involved determining appropriate codes through a critical review of responses and forming themes from those codes (Flick, 2014). Using the coding process, this research obtained 44 codes, 17 categories and 5 themes from the qualitative data.

In this study, the information from interviews was used as a source to provide data for coding. Regarding the coding process, comparisons were made between the results and the existing literature. To make the collected qualitative data useful, it was important to authentically transcribe the data from the recorded interviews and decide what kind of information was relevant to the research (Hesse-Biber & Leavy, 2010). The collected data in the forms of text and audio were thoroughly read and listened to by the researcher. In this process, the researcher was able to familiarise herself with the data and the ideas on the topic. After these

preparations were done, a three-step coding approach was applied to synthesise the themes and categories into theories. The coding process is pivot in forming theories in that it provides a systematic way for the researchers to study the qualitative data (Fan, 2011). The three-step coding includes the processes of open coding, axial coding, and selective coding (Fan & Le, 2014), within which the researcher identified the initial data, grouped the themes and concepts after careful comparisons, and synthesised them into categories.

The first phase of the coding process was open coding or initial coding (Sarantakos, 2013). This step enabled the researcher to identify concepts, properties, and dimensions and then develop them into substantive codes. At this stage, different pieces of data were constantly compared with each other to generate abstract categories (Punch, 2013). As a result, segments of the raw data were clearly labeled in a descriptive manner. The responses to the identified codes were constructed according to the frequency of their occurrence and the relationships among different codes were revealed.

The second step, axial coding, was about relating the initial codes that were identified in the previous step to each other and making connections between them (Sarantakos, 2013). In the axial coding process, as suggested by Punch (2013), the categories that had been created in the open coding were reassembled according to their interconnections which better represented the meanings of the codes.

The final step was selective coding, which involves systematically relating all other categories to the selected core generalisations and ideas (Bryman, 2015). The key goal of this process was to develop a core category which would be the guide to theoretical construction (Punch, 2013). In these activities, the codes were refined to make sure they are consistent and integrated toward theory building (Flick, 2014). In this research, the researcher determined the key elements of the codes and made connections among assumptions by outlining the five themes in the views of the participants on online Maritime English education in China: current status of, needs, readiness and recommendations for online Maritime English education in China, and barriers to implementing online Maritime English education in China. The detailed qualitative data analysis will be elaborated in Chapter 5.

3.6 Reliability and validity

Reliability and validity are critical to the success of a research study since reliability and validity can build truthfulness, credibility, and believability of the research results (Neuman, 2011). Reliability refers to the stability and consistency of the instruments (Sekaran, 1999). Reliability can be divided into external reliability and internal reliability (McLeod, 2007). Internal reliability measures the consistency of results across the items that assess the same construct within a test while external reliability evaluates the extent to which consistent results can be obtained across a range of measurements (McLeod, 2007). The internal reliability of this research is explored through Cronbach's Alpha values, which is discussed in Chapter 4. In this section, the external reliability will be verified.

Generally, two kinds of biases, namely, respondent bias and instrumentation biases, may jeopardise the external reliability of the research (Hair et al., 2015). Instrumentation biases occur when research instruments are not appropriately designed or presented (Hair et al., 2015). To avoid possible instrumentation bias, every effort was made in various aspects of the design stage. The draft of the questionnaire and interview questions were examined by the members of the research team, academic staff, colleagues of the researcher, maritime students and Maritime English teachers. Their feedback provided the researcher with a broader view to avoid bias and prejudice in revising and refining the final version. Effort was made to avoid ambiguity or double-barrelled questions. The accuracy of translation was guaranteed by the rigorous process described in Section 3.5.2. In addition, sensitive information was avoided so that the participants would not feel offended or challenged in answering the questions.

Respondent bias occurs when the participants are influenced by some factors during the survey (Hair et al., 2015). For instance, if a survey is conducted under pressure and negative moods, it would lead to participant error or participant bias (Saunders et al., 2011). To eliminate respondent bias, as suggested by Neuman (2012), the study included multiple sources of data, multiple instruments and multiple participant groups; and the questions were asked from different aspects. In this way, this study is considered reliable as the results would not be significantly different if it is conducted again under the same circumstances. Merriam (1998) believes that ensuring reliability involves conducting the research in an ethical manner. Before taking part in the research, the participants were informed the collected data would be

kept confidential and anonymous. In this way, the participants could feel free to express their ideas.

Validity indicates the extent to which the measuring device or technique is truly assessing what the research is intended to measure (Pallant, 2016). There are also two kinds of validity: internal and external. Internal validity includes criterion validity, construct validity, and content validity while external validity refers to the extent to which the findings can be generalised to other settings (Punch, 2013). This study focuses more on achieving internal validity rather than external validity because generalisability was not directly related to the aim of this research.

Common threats to internal validity are defined as: history, testing, instrumentation, maturation, selection, regression, experimental mortality, and interaction of threat (Slack & Draugalis, 2001). These threats were regarded as minor in this research since it involved no experiment and was conducted during a relatively short period. As proposed by Slack and Draugalis (2001), the randomisation strategy employed during the sampling process, the chosen sample size and avoidance of unnecessary changes in the testing procedure, ensure the validity of this research. In addition, some methods employed to guarantee reliability were also beneficial to the internal validity of this study, such as using multiple sources of data, the rigorous translation process and consulting experts as well as the potential participants about the research instruments.

3.7 Triangulation

To ensure the reliability and internal validity of this research, as Golafshani (2003) proposed, a triangulation process was adopted in the project design. Triangulation is a process that uses different kinds of measurements or data collection methods to analyse the same variable (Sarantakos, 2013). In other words, triangulation tests the consistency of conclusions from different perspectives (Adams, 2012). This research used triangulation to observe online Maritime English education from the perspectives of both students and teachers so that the findings of this research were more reliable and valid.

In order to triangulate the data, the researcher obtained information through different instruments and different sample groups to enhance the dependability and trustworthiness of the data. Furthermore, the systematic data collection and analysis ensured that the findings of

the research could accurately reflect the theme under investigation (Henn, Weinstein, & Foard, 2005). The sampling methods applied in this research helped avoid possible bias. The participants were diversified in terms of different educational institutions, geographical locations, academic backgrounds, degrees and levels of technical abilities. The various backgrounds and status of the participants ensured the findings of the study were reliable and valid when they were generalised to the whole target population. Moreover, the perceptions of both Maritime English teachers and maritime students were included in this research. By exploring their views, understandings and experiences related to online Maritime English education, the researcher was able to have a comprehensive understanding of the topic from the multi-dimensional data sources and opinions. In addition, the employment of both quantitative and qualitative methods provided the researcher with an opportunity to gain a more accurate and credible understanding of the research through the combination of the interviews and questionnaires.

3.8 Ethical considerations

Ethical considerations require the social researcher to obey moral and professional obligations and to carry out the research in an ethical way throughout (Neuman, 2012). The researcher in this study took full consideration of the ethical issues during the whole process of the research. The issues, such as participant recruitment, data collection, storage, interpretation and reporting of this research, were carried out according to the professional standards and ethical guidelines. This research was approved by the Tasmania Social Sciences Human Research Ethics Committees on August 18, 2016. The ethics reference number of this research is H0015968. The approval means the design and the conduct of this research did not conflict with the required ethical guidelines. The letter of approval is attached in Appendix 1.

This study brought no harm to the participants. All the participants recruited were mentally and physically healthy adults. They were able to independently make decisions about whether to participate in the research on their own willingness. Detailed information about the research was provided before they decided to answer the questions. The participants were involved only if they were willing to participate. No data were collected or used without the participants' consent. There were no sensitive personal or political issues included in the research questions. The participants would thus not feel offended when they answered the questions of the questionnaires or interviews. They could withdraw their participation

whenever they wanted during the process. Within 28 days after the interviews, the participants still had the right to withdraw their data. Their withdrawal from this study would not cause any effect on their later lives.

The responses to the questionnaires were anonymous and were recorded as non-identifiable data. No participant could be identified once his/her questionnaire was finished. The responses to the interview questions were recorded in re-identifiable data, but all information was treated in a confidential manner. Nobody other than the investigators could access the original information of the interviews. All the references to the personal information of the participants were erased from the interview transcripts. The researcher would not discuss any opinions or details of the participants with other people. Any publications arising out of this research would not reveal any individual's information. In this way, the participants' confidentiality was well protected.

The data storage was also taken into full ethical considerations. Both data collected electronically and in paper form were stored securely. Data collected online using QuestionPro were stored temporarily on secure servers in the US. All the online responses were downloaded to password-protected network storage areas at the University of Tasmania. All the paper copies of interviews and original transcripts in the audio-taped files were carried personally by the researcher to the University of Tasmania after the data collection process. The paper files were locked in a special cabinet in the investigator's office and the recorded files were downloaded to a password-protected file stored in a network storage area of the Faculty of Education at the University of Tasmania. All the files were conducted on a password-protected server during the period of data analysis and thesis writing. All data would be destroyed five years after the completion of this project. At that time, this information would be removed in sealed bags and then shredded by a contractor used specifically to cope with confidential wastes from the university.

3.9 Summary

This chapter has provided a methodological basis on which the actual research was built. In this chapter, the researcher has outlined the research process, giving reasons for the adopted research approach and design. The use of a mixed methods approach helped the researcher gain both broad and in-depth views of the maritime students and Maritime English teachers on the research issues. Research design, research instruments and sampling for the study,

have been discussed in detail. The issues of data collection, as well as a brief description of the data analysis process, have been presented. Reliability and validity, and ethical considerations have also been discussed in this chapter. In the next chapter, a detailed analysis of quantitative data and the findings are presented.

Chapter 4 Quantitative Data Analysis

4.1 Introduction

This chapter analyses the results of the quantitative data which were gathered from the questionnaires, including sections from Part A to Part E. Part A includes independent variables of the participants' background information. The other sections include variables that were designed to investigate the three main aspects related to online Maritime English education in China.

To inform the selection of relevant data analysis statistics, the skewness, kurtosis, Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess the distributions of the dependent variables (Allen, Bennett, & Heritage, 2014). Skewness and kurtosis present the information on the symmetry and the "peakedness" of the data distribution respectively (Pallant, 2016). When the values of skewness and kurtosis are 0, it is considered the ideal situation of normal distribution (Allen et al., 2014). After calculation, the values of many items in the questionnaires were larger than 1, which were not close to 0. Since skewness and kurtosis can possibly be over sensitive with large samples (Pallant, 2016), in this research, Kolmogorov-Smirnov and Shapiro-Wilk tests were employed as supplementary tests to evaluate the normality of the collected data (Allen et al., 2014). When the Sig. value is less than 0.05, both tests would indicate the rejection of the hypothesis of normality distribution (Allen et al., 2014). As the Sig. values calculated by both tests on the dependent variables were all 0.000, which indicated these variables were non-normally distributed, non-parametric tests were chosen for the data analysis.

In this research, different types of non-parametric statistical techniques were employed in the quantitative data analysis. Descriptive data were analysed as the first step to provide the values of median, frequencies, and percentages of the variables. Then, Exploratory Factor Analysis (EFA) was used to explore the underlying structure of observed variables. The internal reliability of the questionnaires was verified through Cronbach's Alpha. Structural Equation Modelling (SEM) was employed to show the strength of the interrelationships between multilevel variables. After that, a Kruskal-Wallis test was used to check whether the independent variables were related to the responses of dependent variables (Pallant, 2016). If the p-value is lower than 0.05, it is regarded that a statistically significant difference exists in the variables from different groups (Pallant, 2016). Then, a Mann-Whitney U test was

conducted to determine which groups were statistically different from each other (Pallant, 2016). Finally, a Spearman's Rank Order Correlation (rho) was used to measure the strength of the relationship between the participants' responses (Ramsey, 1989).

4.2 Biographic information

There were 265 respondents who completed the questionnaires. The data were gathered from two groups, the maritime student group (N=243) and the Maritime English teacher group (N=22). These participants completed the questionnaires which were provided online through the QuestionPro website. After the data collection, the answers were input and analysed using IBM SPSS software Version 23. It was found that 10 completed questionnaires by 9 maritime students and 1 Maritime English teacher missed more than 50% of data. They are discarded from actual data analysis. The remaining 255 responses, including 234 responses from maritime students and 21 from Maritime English teachers, were used for data analysis. This number of responses meets the recommended sample size which was discussed in Chapter 3.

The biographic information in Part A of the questionnaires includes students' educational qualification, students' major, students' grade, dominant teaching mode, the employment of an online learning platform, students' Maritime English ability, online experience and class size. These independent variables may be associated with the participants' perceptions towards online Maritime English education. This section will present the findings related to the biographic information which is grouped by maritime students shown in Table 4.1 and Maritime English teachers shown in Table 4.2.

Table 4. 1. *Students' biographic information*

Variables	Choices	Number (n/N)	Percentage (%)
Educational qualification	A vocational certificate	9/234	3.8
	An associate degree	124/234	53.0
	A Bachelor's degree	101/234	43.2
	Other	0/234	0.0
Major	Navigation	174/234	74.4
	Marine Engineering	60/234	25.6
Grade	The first year	71/234	30.3
	The second year	72/234	30.8
	The third year	86/234	36.8
	The fourth year	4/234	1.7
	The fifth year or higher	1/234	0.4
Dominant teaching mode	the traditional teaching	226/234	96.6
	online teaching	8/234	3.4
The employment of an online learning platform	Yes	132/234	56.4
	No	102/234	43.6
Students' Maritime English ability	Very poor	35/234	15.0
	Poor	52/234	22.2
	Fair	118/234	50.4
	Good	23/234	9.8
	Excellent	6/234	2.6
Online experience	Less than 1 year	9/234	3.8
	1-3 years	50/234	21.4
	3-5 years	53/234	22.6
	5-8 years	71/234	30.3
	Over 8 years	51/234	21.8
Class size	1-20 students	0/234	0.0
	21-30 students	34/234	14.5
	31-40 students	79/234	33.8
	41-50 students	65/234	27.8
	Over 50 students	56/234	23.9

Table 4.1 shows that the majority of the student participants were studying for an associate degree (53.0%, n=124) or for a Bachelor's degree (43.2%, n=101). The remaining student participants were studying for a vocational certificate (3.8%). The students were either majoring in Navigation (74.4%, n=174) or in Marine Engineering (25.6%, n=60). The

students in their first three years presented the majority of the participating students (97.9%, n= 229): the first year (30.3%, n=71), the second year (30.8%, n=7), and the third year (36.8%, n=86). It was found that the traditional teaching mode (96.6%, n=226) was much more common than online teaching mode (3.4%, n=8). A small majority of the surveyed students (56.4%, n=132) believed that there was an online platform for their Maritime English studies. Half of the student respondents regarded their Maritime English abilities as fair (50.4 %, n=118), which corresponds to value 3 in the five-point Likert scale and can be considered as middle level; and 15% (n=35) reported their abilities as very poor and 3.6% (n=6) as excellent. As for online experience, around one-third of students (30.3%, n=71) had the experience of 5-8 years. It is noticeable that there were still 9 students (3.8%, n=9) who reported they only had less than one-year's online experience. The last biographic information was about the size of Maritime English class which is believed to have a correlation with the possibility and performance of online education (Orellana, 2006). The most common class size was around 31-40 students, which accounted for 33.8% (n=79) of the participating students.

Table 4. 2. *Teacher's biographic information*

Variables	Choices	Number (n/N)	Percentage (%)
Students' educational qualification	A vocational certificate	3/21	14.3
	An associate degree	11/21	52.4
	A Bachelor's degree	7/21	33.3
	Other	0/21	0.0
Students' major	Navigation	14/21	66.7
	Marine Engineering	7/21	33.3
Students' grade	The first year	5/21	23.8
	The second year	8/21	38.1
	The third year	4/21	19.0
	The fourth year	4/21	19.0
	The fifth year or higher	0/21	0.0
Dominant teaching mode	the traditional teaching	20/21	95.2
	online teaching	1/21	4.8
The employment of an online learning platform	Yes	5/21	23.8
	No	16/21	76.2
Students' Maritime English ability	Very poor	5/21	23.8
	Poor	8/21	38.1
	Fair	8/21	38.1
	Good	0/21	0.0
	Excellent	0/21	0.0
Online experience	Less than 1 year	3/21	14.3
	1-3 years	3/21	14.3
	3-5 years	0/21	0.0
	5-8 years	4/21	19.0
	Over 8 years	11/21	52.4
Class size	1-20 students	0/21	0.0
	21-30 students	6/21	28.6
	31-40 students	9/21	42.9
	41-50 students	3/21	14.3
	Over 50 students	3/21	14.3

As can be seen from Table 4.2, regarding students' educational qualification, the teacher participants shared a similar response distribution with that of students. The majority of their students studying for an associate degree (52.4%, n=11) or a Bachelor's degree (33.3%, n=7). The teachers were either teaching Navigation (66.7%, n=14) or Marine Engineering (33.3%,

n=7). When being asked “in which year your students are studying”, the majority of responses of this group (80.9%, n =17) concentrated on the first three years with the first year (23.8%, n=5), the second year (38.1%, n=8), and the third year (19%, n=4) respectively. According to these teachers’ responses, the traditional teaching mode (95.2%, n=20) was much more widely adopted than online teaching mode (4.8%, n=1). The small proportion of “online teaching” mode indicated that teachers had a low level of participation in online Maritime English activities. Contrary to students’ responses, the majority of the teachers (76.2%, n=16) believed that there was no online platform being applied to their students’ Maritime English learning in China. The teachers believed that most of their students’ Maritime English ability was not very high, with 38.1% (n=8) reporting that students’ Maritime English ability as poor or fair respectively and 23.8% (n=5) as very poor. It is noticeable that there was no teacher regarding their students’ Maritime English ability as good or excellent. As for online experience, about half of the teachers (52.4%, n=11) had over 8-year online experience, but still 14.3% (n=3) of the teachers mentioned they had little or no online experience (less than one-year). The teacher responses to the class size were focused on “31-40 students” (42.9%, n=9) and nobody chose “1-20 students”.

4.3 Descriptive analysis

This section aims to examine the correlations between the independent and dependent variables and between the dependent variables themselves. The question items in Part A produced independent variables about the participants’ biographic background that might be associated with the dependent variables. The questions in Part B to Part D were designed to examine the current status of, the needs and readiness for online Maritime English education in China. The measurement of these three parts was based on five-point Likert scale, ranging from 1 (=Strongly Disagree) to 5 (=Strongly Agree). The participants were asked to answer each question by choosing a single value from the scale.

4.3.1 Current status of Maritime English education in China

Part B of the questionnaires was composed of 22 questions that investigated the current status of online Maritime English education in China. For descriptive data analysis, the median, frequency and percentage values were calculated to provide primary information about each variable. Kruskal-Wallis tests and Mann-Whitney U test were then adopted to examine the possible factors that may have influenced their answers.

The questions in Part B were divided into five sections. The first section, from Question 9 to Question 13, focused on the current status of online assessment and feedback of Maritime English study. The second section, which was about online learning materials, had 3 questions. Online learning interactions were investigated in the third section of Part B, from Question 17 to Question 22. The next four questions, that is, Question 23 to Question 26, examined current online technologies applied in Maritime English study. The last part, including Question 27 to Question 30, was related to the relevant technical support. The values on the Likert scale represent the degree of agreement. The scale range was from 1 to 5, accordingly from 'Strongly Disagree' to 'Strongly Agree'. The following part provides a descriptive analysis to each section in Part B. Frequency, percentage of each choice, mean, median and mode values are presented to obtain the general information of the participants' responses.

4.3.1.1 Online assessment and feedback

It can be seen from Table 4.3 that the median of Q9 and Q11 was higher than that of the other questions. Among the questions listed in Table 4.3, Q9 (online assessments are used in my Maritime English courses) had the highest degree of agreement (45.4%). The participants generally disagreed with statements Q10, Q12, and Q13, whose median values were 2. This is in alignment with the percentage of each item. Only around 15% of the participants agreed or strongly agreed on Q13 that "diverse types of online feedback are provided to me/my students, such as in written, video or audio forms". Abound 30% of the participants chose either "Agree" or "Strongly Agree" on Q10 and Q12. This indicates that the forms of online assessments were not varied and online feedback was not widely used, the reasons for which should be explored further.

Table 4. 3. *Participants' responses to views about the assessment and feedback*

Items		SD	D	N	A	SA	Median
Q9. Online assessments are used in my Maritime English courses.	Count	42	37	60	96	20	3
	% of Total	16.5%	14.5%	23.5%	37.6%	7.8%	
Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	Count	44	90	54	54	13	2
	% of Total	17.3%	35.3%	21.2%	21.2%	5.1%	
Q11. The current online assessments can measure my/my students' Maritime English learning from different aspects.	Count	37	71	51	72	15	3
	% of Total	15.0%	28.9%	20.7%	29.3%	6.1%	
Q12. Feedback of assessment is provided to me/my students via online methods.	Count	47	87	40	62	19	2
	% of Total	18.4%	34.1%	15.7%	24.3%	7.5%	
Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms.	Count	51	117	47	29	11	2
	% of Total	20.0%	45.9%	18.4%	11.4%	4.3%	

4.3.1.2 Online Maritime English learning materials

In Table 4.4, the participants held a relatively positive view regarding online learning materials. Around half of the participants agreed or strongly agreed that there were some online learning materials that were applied in Maritime English studies (Q14). A similar percentage of the participants believed that the provided online learning materials were appropriate to students' English level (Q15) and various forms of Maritime English learning materials were provided via online methods (Q16).

Table 4. 4. *Participants' responses to views about online learning materials*

Items		SD	D	N	A	SA	Median
Q14. Some online learning materials are provided in my Maritime English courses.	Count	17	45	70	102	21	3
	% of Total	6.7%	17.6%	27.5%	40.0%	8.2%	
Q15. The provided online learning materials are appropriate to my/my students' English level.	Count	23	52	66	85	23	3
	% of Total	9.2%	20.9%	26.5%	34.1%	9.2%	
Q16. Various forms of Maritime English learning materials are provided to me/my students via online methods.	Count	23	69	68	78	17	3
	% of Total	9.0%	27.1%	26.7%	30.6%	6.7%	

4.3.1.3 Online learning interactions

The descriptive statistical results shown in Table 4.5 are in relation to the participants' views on online learning interactions. Less than half of the participants agreed or strongly agreed

that they had some kind of teacher-student online learning interactions (Q17, 45.1%) and peer interactions (Q18, 38.1%) during Maritime English study. Around 40% of them had both synchronous (Q19, 39.2%) and asynchronous (Q20, 41.9%) interactions for Maritime English study. They reported that certain guidance for online interactions was provided by their Maritime English teachers (Q21, 49.6%) and around half of them agreed the online interactions conducted for Maritime English studies improved students' Maritime English level (Q22).

Table 4. 5. *Participants' responses to views about online learning interactions*

Items		SD	D	N	A	SA	Median
Q17. I interact with Maritime English teachers/my maritime students online for Maritime English study.	Count	24	60	56	92	23	3
	% of Total	9.4%	23.5%	22.0%	36.1%	9.0%	
Q18. I/My students interact with peers online for Maritime English study.	Count	36	59	63	79	18	3
	% of Total	14.1%	23.1%	24.7%	31.0%	7.1%	
Q19. I/My students interact online synchronously with others for Maritime English study.	Count	44	55	56	75	25	3
	% of Total	17.3%	21.6%	22.0%	29.4%	9.8%	
Q20. I/My students interact online asynchronously with others for Maritime English study.	Count	26	62	60	87	20	3
	% of Total	10.2%	24.3%	23.5%	34.1%	7.8%	
Q21. My Maritime English teacher/I provides/provide guidance on my online interactions.	Count	23	40	63	100	24	3
	% of Total	9.2%	16.0%	25.2%	40.0%	9.6%	
Q22. The online interactions conducted for Maritime English studies improved my/my students' Maritime English level.	Count	16	49	64	98	21	4
	% of Total	6.5%	19.8%	25.8%	39.5%	8.5%	

4.3.1.4 Technologies related to online Maritime English study

Table 4.6 demonstrates that the participants held more positive views towards Q25 and Q26 than Q23 and Q24. Specially, around 40% of the participants agreed or strongly agreed that online tools were provided by their institutions (Q23, 35.7% median=3), and the provided online tools performed stably in the process of Maritime English education (Q24, 43.6%, median=3). Over half of the participants agreed on the statement that some online tools provided were allowed to be used for Maritime English study (Q25, 63.2%, median=4) and online tools used in Maritime English courses could enhance the motivation of students in learning (Q26, 52.4%, median=4).

Table 4. 6. *Participants' responses to views about technologies related to online Maritime English study*

Items		SD	D	N	A	SA	Median
Q23. My institution provides online tools for my Maritime English education.	Count	31	59	74	64	27	3
	% of Total	12.2%	23.1%	29.0%	25.1%	10.6%	
Q24. The online tools provided by my institution perform stably in the process of my Maritime English education.	Count	16	37	88	84	25	3
	% of Total	6.4%	14.8%	35.2%	33.6%	10.0%	
Q25. I/My students am/are allowed to use some online tools provided by my institution to study Maritime English.	Count	7	30	56	126	34	4
	% of Total	2.8%	11.9%	22.1%	49.8%	13.4%	
Q26. Online tools used in my Maritime English courses enhance my/my students' motivation in learning.	Count	14	42	63	95	36	4
	% of Total	5.6%	16.8%	25.2%	38.0%	14.4%	

4.3.1.5 Technical support related to online Maritime English study

Table 4.7 provides descriptive statistics on the participants' opinions about technical support related to online Maritime English study. As indicated in Table 4.7, around half of the participants agreed or strongly agreed that some training (Q27, 46.0%, median=3) and technical support (Q28, 45.0%, median=3) were provided for Maritime English study. It is worth noticing that Q30 had a relatively high value of median (value=4) which indicates a relatively high agreement (Q30, 64.7%) on the statement that some forms of peripheral support are provided for Maritime English education. However, regarding whether technical support is provided in a timely manner, the participants' responses were more negative. Only 29.6% of the respondents agreed or strongly agreed on this statement.

Table 4. 7. *Participants' responses to views about technical support*

Items		SD	D	N	A	SA	Median
Q27. My institution provides training on how to use online tools for my Maritime English education.	Count	12	51	73	96	20	3
	% of Total	4.8%	20.2%	29.0%	38.1%	7.9%	
Q28. My institution provides technical support for my online Maritime English education.	Count	11	47	80	96	17	3
	% of Total	4.4%	18.7%	31.9%	38.2%	6.8%	
Q29. Technical support is provided to me in a timely manner.	Count	29	74	73	56	18	3
	% of Total	11.6%	29.6%	29.2%	22.4%	7.2%	
Q30. Other than the resources provided in the class, my institution provides some forms of peripheral support for my Maritime English education.	Count	11	27	52	125	40	4
	% of Total	4.3%	10.6%	20.4%	49.0%	15.7%	

4.3.2 Needs for online Maritime English education

Part C of the questionnaires had 18 questions designed to investigate the needs for online Maritime English education in China. It was composed of five sections. The first section, from Question 31 to Question 35, focused on the needs for assessment and feedback of online Maritime English education. The second section, which was about the needs for online learning materials, had 3 questions from Question 36 to Question 38. The needs for online learning interactions were investigated in the third section from Question 39 to Question 42. The next three questions, from Question 43 to Question 45, examined the needs for technology and the last section from Question 46 to Question 48 examined the needs for relevant support. Median, frequency and percentage values were calculated to provide general information about the needs for online Maritime English education.

Table 4. 8. *Participants' responses to needs for online Maritime English education*

Items		SD	D	N	A	SA	Median
Q31. I/My students need online assessments of Maritime English.	Count	9	35	77	107	27	4
	% of Total	3.5%	13.7%	30.2%	42.0%	10.6%	
Q32. I/My students need multiple types of online assessments for Maritime English courses.	Count	4	26	61	129	34	4
	% of Total	1.6%	10.2%	24.0%	50.8%	13.4%	
Q33. I/My students need online feedback for Maritime English assessments.	Count	2	20	61	127	43	4
	% of Total	0.8%	7.9%	24.1%	50.2%	17.0%	
Q34. I/My students need many online assessments to track Maritime English learning progress.	Count	9	24	73	113	36	4
	% of Total	3.5%	9.4%	28.6%	44.3%	14.1%	
Q35. I/My students need different types of online feedback to track Maritime English progress, such as written, video or audio forms.	Count	4	17	56	128	47	4
	% of Total	1.6%	6.7%	22.2%	50.8%	18.7%	
Q36. I/My students prefer online Maritime English materials to paper-based materials.	Count	12	37	74	96	33	4
	% of Total	4.8%	14.7%	29.4%	38.1%	13.1%	
Q37. I/My students need online Maritime English materials of different levels.	Count	3	3	51	128	68	4
	% of Total	1.2%	1.2%	20.2%	50.6%	26.9%	
Q38. I/My students need online Maritime English materials in multiple forms.	Count	2	10	53	135	55	4
	% of Total	0.8%	3.9%	20.8%	52.9%	21.6%	
Q39. I/My students need to interact with teachers online for Maritime English study.	Count	8	12	67	122	46	4
	% of Total	3.1%	4.7%	26.3%	47.8%	18.0%	
Q40. I/My students need to interact with peers online for Maritime English study.	Count	5	19	69	112	49	4
	% of Total	2.0%	7.5%	27.2%	44.1%	19.3%	
Q41. I/My students need synchronous online interactions for Maritime English study.	Count	7	20	82	107	39	4
	% of Total	2.7%	7.8%	32.2%	42.0%	15.3%	
Q42. I/My students need asynchronous online interactions for Maritime English study.	Count	6	18	57	135	37	4
	% of Total	2.4%	7.1%	22.5%	53.4%	14.6%	
Q43. I/My students need online platforms to support Maritime English study.	Count	4	12	71	122	46	4
	% of Total	1.6%	4.7%	27.8%	47.8%	18.0%	
Q44. I/My students need to use different online tools for Maritime English study.	Count	5	16	58	127	49	4
	% of Total	2.0%	6.3%	22.7%	49.8%	19.2%	
Q45. I/My students need online devices provided by my institution to study Maritime English.	Count	4	10	56	126	57	4
	% of Total	1.6%	4.0%	22.1%	49.8%	22.5%	
Q46. I/My students need training for online Maritime English study.	Count	10	10	64	124	47	4
	% of Total	3.9%	3.9%	25.1%	48.6%	18.4%	
Q47. I/My students need my institution to provide relevant support on online Maritime English study.	Count	4	7	42	137	61	4
	% of Total	1.6%	2.8%	16.7%	54.6%	24.3%	
Q48. In the online Maritime English study, I/my students need to know where and how to obtain technical support.	Count	3	15	48	145	41	4
	% of Total	1.2%	6.0%	19.0%	57.5%	16.3%	

As shown in Table 4.8, all the median values were concentrated on value 4, which indicated the majority of the participants expressed agreement on the needs for online Maritime English in China. For this reason, the descriptive analysis of this part analysed all the questions as a whole. Table 4.8 also shows the weight distribution of each scale for each question item. With no exception, the answers were concentrated on option 4 (=Agree) on the five-point Likert scale with a percentage ranging from 38.1% to 57.5%. As such, a large number of participants indicated their needs for online Maritime English education in China. The combined percentage of "Agree" and "Strong Agree" was above 70% for Q37, Q38, Q45, Q47, and Q48. These five questions with high agreement are related to online Maritime English materials of different levels, multiple forms of online Maritime English materials, online devices provided by the institutions and the information about where and how to obtain technical support. The choices of "Disagree" were very low compared to that of "Agree". Q31 (the needs for online assessments of Maritime English) and Q36 (the needs for different types of online feedback) had a relatively high respondent rate on "Disagree". It is worth mentioning that although Q31 (the needs for online assessments of Maritime English) and Q41 (the needs for synchronous online interactions) had a relatively high percentage on "Agree", there were still over 30% of respondents rated on the choice "Neutral", which indicated the participants were somewhere between agree and disagree on these statements. In addition, Table 4.8 shows that the two end categories (Strongly Disagree and Strongly Agree) both shared a relatively low percentage for all the items in Part C. This means that the respondents held a relatively reserved opinion towards these questions.

4.3.3 Readiness for online Maritime English education

Part D of the questionnaires had 14 questions designed to inquire into the readiness of online Maritime English education in China. It included four sections. The first section, from Question 49 to Question 53, focused on self-efficacy of online learning. The second section regarding self-management of online learning had 3 questions. Technical readiness was investigated in the third section including Questions 57, 58 and 59. The next three questions from Question 60 to Question 62 examined readiness of relevant support for online learning. Median, frequency and percentage values were calculated to provide general information about readiness for online Maritime English education.

4.3.3.1 Self-efficacy of online Maritime English learning

Table 4.9 indicates that the participants held positive views towards most of the statements relating to self-efficacy of online learning. The participants generally agreed that students can adapt to online Maritime English learning (Q49, median=4), online learning can motivate me/my students to study Maritime English (Q51, median=4), students do not feel frustrated when facing technology-related obstacles (Q52, median=4), and students can seek assistance when facing online learning problems (Q53, median=4). However, the respondents showed a lower agreement on the statement that students were confident in communicating about Maritime English online with others (Q50, median=3). Since confidence in communication is a key factor in language learning (Yashima, Zenuk-Nishide, & Shimizu, 2004), this question is worthy of further exploration.

Table 4. 9. *Participants' responses to self-efficacy of online Maritime English learning*

Items		SD	D	N	A	SA	Median
Q49. I/My students can adapt myself/themselves to online Maritime English learning.	Count	7	14	81	126	27	4
	% of Total	2.7%	5.5%	31.8%	49.4%	10.6%	
Q50. I/My students am/are confident in communicating Maritime English online with others.	Count	19	43	70	103	19	3
	% of Total	7.5%	16.9%	27.6%	40.6%	7.5%	
Q51. Online learning can motivate me/my students to study Maritime English.	Count	7	22	81	115	29	4
	% of Total	2.8%	8.7%	31.9%	45.3%	11.4%	
Q52. I/My students do not feel frustrated when facing technology-related obstacles.	Count	16	41	66	101	31	4
	% of Total	6.3%	16.1%	25.9%	39.6%	12.2%	
Q53. I/My students can seek assistance when facing online learning problems.	Count	4	24	69	128	27	4
	% of Total	1.6%	9.5%	27.4%	50.8%	10.7%	

4.3.3.2 Self-management of online Maritime English learning

Table 4.10 shows that the participants had a relatively positive view regarding the statement that students were willing to share ideas with others online (Q54, median= 4). However, as for the next two questions, the participants held a much more negative view. The median values of Q55 and Q56 are also relatively low (median=3). The results show that 37.6% and 44.3% of the respondents agreed or strongly agreed on these two questions. On account that Q55 and Q56 are the questions concerning students' autonomy and distraction factors in

online learning, both are important in the success of online learning (Moore & Kearsley, 2011), further explorations are conducted on Q55 and Q56.

Table 4. 10. *Participants' responses to self-management of online Maritime English learning*

Items		SD	D	N	A	SA	Median
Q54. I/My students am/are willing to share ideas with others online.	Count	6	21	60	130	38	4
	% of Total	2.4%	8.2%	23.5%	51.0%	14.9%	
Q55. I/My students am/are autonomous in learning.	Count	24	71	64	76	20	3
	% of Total	9.4%	27.8%	25.1%	29.8%	7.8%	
Q56. When studying online, I/my students am/are not easily distracted by other online activities.	Count	23	47	72	91	22	3
	% of Total	9.0%	18.4%	28.2%	35.7%	8.6%	

4.3.3.3 Technical readiness

As can be seen from Table 4.11, the participants had a positive view towards the statements related to technical readiness. More than half (55.8%) of the participants reported that students had the necessary technical skills to support online Maritime English study (Q57, median=4). Most of them (69.1%) also agreed that students were willing to use online tools to enhance their participation in Maritime English study (Q58, median=4) and 63.4% of the participants agreed that when encountering technical obstacles, students could find ways to solve them (Q59, median=4).

Table 4. 11. *Participants' responses to technical readiness*

Items		SD	D	N	A	SA	Median
Q57. I/My students have the necessary technical skills to support my/their online Maritime English study.	Count	7	23	82	114	27	4
	% of Total	2.8%	9.1%	32.4%	45.1%	10.7%	
Q58. I/My students am/are willing to enhance my/their participation in Maritime English study by using online tools.	Count	1	11	66	142	33	4
	% of Total	0.4%	4.3%	26.1%	56.1%	13.0%	
Q59. When encountering technical obstacles, I/my students can find ways to solve them.	Count	7	29	56	129	30	4
	% of Total	2.8%	11.6%	22.3%	51.4%	12.0%	

4.3.3.4 Support for online Maritime English learning

Table 4.12 demonstrates that the participants held relatively positive views towards all of the statements related to support. For example, more than half (59.2%) of the participants agreed

or strongly agreed that students could understand the instructions on how to use online tools (Q60, median=4) and around 60% of the participants could find relevant online resources to support their Maritime English study (Q61, median=4). Similarly, around 60% of the participants agreed on the statement that students could spend some spare time participating in the training in online learning (Q62, median=4).

Table 4. 12. *Participants' responses to the support for online Maritime English learning*

Items		SD	D	N	A	SA	Median
Q60. I/My students can understand the instructions on how to use online tools.	Count	6	25	73	106	45	4
	% of Total	2.4%	9.8%	28.6%	41.6%	17.6%	
Q61. I/My students can find relevant online resources to support Maritime English study.	Count	6	27	70	118	34	4
	% of Total	2.4%	10.6%	27.5%	46.3%	13.3%	
Q62. I/My students can spend some spare time participating in the training on online learning.	Count	4	28	78	107	36	4
	% of Total	1.6%	11.1%	30.8%	42.3%	14.2%	

4.4 Exploratory Factor Analysis (EFA)

Factor analysis is a data reduction method that is employed to examine the underlying constructs within the collected data (DeCoster, 1998). By clustering variables along dimensions, factor analysis summarises a large set of variables into a smaller set of meaningful components (Pallant, 2016). Although the design of the questionnaires was developed from some research findings and frameworks in the existing literature, the correlations among the variables need to be tested and verified. For modified or newly developed scales, EFA would be appropriate in exploring or verifying the underlying structure of observed variables (Pallant, 2016). Thus, this section will use EFA to gather information about the inter-relationships among the variables.

The number of factors retained in each case was assisted by Kaiser's criterion with a minimum required eigenvalue of 1.0 and scree test which is used to retain all the factors above the change point in the plot (Pallant, 2016). The inclusion of a specific item in a given factor was considered when a factor loading was greater than 0.30 and a minimum 0.10 difference occurred between the loading on this factor and the other defined factors (Chen & Willits, 1998).

Prior to performing the EFA, the suitability of data for factor analysis was assessed. The valid sample size of this research was 255, which meets the minimum desirable number of 200 for factor analysis (Cattell, 1978; Gorsuch, 1983). Although the collected data were not perfectly normally distributed, these deviations were not problematic on account of the fertile nature of factor analysis (Allen et al., 2014).

The obtained values of the correlation coefficients of the items in Part B, Part C, and Part D revealed that the majority of them were greater than 0.30. In addition, most of the correlations shown in the correlation matrix were significant, which indicated that the relationship between pairs of variables was generally linear. Table 4.13 shows that the Kaiser-Meyer-Olkin (KMO) values of Part B, Part C, and Part D all exceeded the recommended minimum value of 0.6 (Pallant, 2016) and reached the marvelous degree of common variance (Kaiser, 1974). Similarly, Bartlett's Test of Sphericity indicated a statistical significance (p=0.000) for Part B, Part C, and Part D, supporting the factorability of the correlation matrix (Bartlett, 1954). Thus, the conditions for carrying out further exploration were met.

Table 4. 13. *Results of the KMO and Barlett's test of Part B, Part C, and Part D*

KMO and Bartlett's Test		**Part B**	**Part C**	**Part D**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.910	.890	.859
Bartlett's Test of Sphericity	Approx. Chi-Square	1911.722	1749.488	1061.742
	df	231	153	91
	Sig.	.000	.000	.000

4.4.1 EFA of Part B: Current status of online Maritime English education

The Total Variance Explained shown in Table 4.14revealed that four components in Part B, with eigenvalues exceeding 1, explained 35.613%, 7.766%, 6.580% and 5.153% of the variance respectively. The four components in Part B explained a cumulative percentage of 55.112% of the variance which met the minimum requirement (50%-60%) for explained variance in the humanities (Hair, Black, Babin, & Anderson, 2013).

Table 4. 14. *Total variance explained of Part B*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.835	35.613	35.613	7.835	35.613	35.613	5.927
2	1.709	7.766	43.379	1.709	7.766	43.379	5.011
3	1.448	6.580	49.959	1.448	6.580	49.959	5.482
4	1.134	5.153	55.112	1.134	5.153	55.112	3.347

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

The pattern matrix in Table 4.15 shows four components: (1) related online support; (2) online materials and feedback; (3) online interactions; and (4) online assessments. Communalities, which present the extent of the variance in each item, need to be suppressed if the absolute value is very low (<0.3) (Pallant, 2016). All the loadings shown in Table 4.15 exceeded the absolute loading value of 0.3 or -0.3 which are considered acceptable for factor analysis (Hori, Richards, Kawamoto, & Kunugi, 2011). The four-factor solution represented the expected underlying theoretical constructs and the values of the Cronbach's Alpha for each section were 0.841, 0.733, 0.836 and 0.714, suggesting acceptable internal consistency among the items (Pallant, 2016). Therefore, a decision was made to retain the four-factor solution for the subsequent analyses. However, for the cross-section loading items Q21 and Q29, they were deleted with a strikethrough because they had close loadings with less than 0.2 differences.

Table 4. 15. *Pattern matrix of Part B*

	Component			
	1	2	3	4
Q25. I/ My students am/are allowed to use some online tools provided by my institution to study Maritime English.	.776			
Q24. The online tools provided by my institution perform stably in the process of my Maritime English education.	.743			
Q27. My institution provides training on how to use online tools for my Maritime English education.	.724			
Q30. Other than the resources provided in the class, my institution provides some forms of peripheral support for my Maritime English education.	.715			
Q28. My institution provides technical support for my online Maritime English education.	.637			
Q23. My institution provides online tools for my Maritime English education.	.566			
Q26. Online tools used in my Maritime English courses enhance my/ my students' motivation in learning.	.435			
Q12. Feedback of assessment is provided to me/ my students via online methods.		.644		
Q14. Some online learning materials are provided in my Maritime English courses.		.629		
Q13. Diverse types of online feedback are provided to me/ my students, such as in written, video or audio forms.		.605		
Q16. Various forms of Maritime English learning materials are provided to me/my students via online methods.		.586		
Q15. The provided online learning materials to me/ my students are appropriate to my/my students' English level.		.532		
Q22. The online interactions conducted for Maritime English studies improved my/ my students' Maritime English level.		.418		
~~Q21. My Maritime English teacher/I provides/ provide guidance on my online interactions.~~		~~.397~~	~~.342~~	
Q20. I/ My students interact online asynchronously with others for Maritime English study.			.912	
Q19. I/ My students interact online synchronously with others for my Maritime English study.			.908	
Q18. I/ My students interact with peers online for Maritime English study.			.748	
Q17. I interact with my Maritime English teachers/my maritime students online for Maritime English study.			.669	
Q10. Varied online assessments are used in my/ my students' Maritime English study, such as informal self-evaluation or formal ones.		.466		.656
Q9. Online assessments are used in my Maritime English courses.		.316		.635
~~Q29. Technical support is provided to me in a timely manner.~~	~~.494~~	~~.380~~		~~.604~~
Q11. The current online assessments can measure my/ my students' learning from different aspects.		.400		.526

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 19 iterations.

The first extracted component shown in Table 4.15 included seven distinctive items (Q23, Q24, Q25, Q26, Q27, Q28 and Q30) regarding the related online support. This component accounted for most of the total variance in Part B (35.613%). The highest factor loadings in this component were Q25 and Q24 with 0.776 and 0.743 respectively.

The second component which was composed of Q12, Q13, Q14, Q15, Q16, and Q22was mainly related to online materials and feedback. Specifically, Q12 and Q13 were associated with online feedback while the other three questions were related to online materials. This component accounted for 7.766% of the total variance. The two highest factor loadings in this component were Q12 and Q14, which were related to the general information about online feedback and materials.

The factors (Q17, Q18, Q19, and Q20) in the third component were about online interactions. In this case, the third component was identified and labeled as online interactions, which accounted for 6.580% of the total variance. Very high factor loading values were found in the factors of asynchronous and synchronous online interactions with loading values of 0.912 and 0.908 respectively.

The fourth component (Q9, Q10, and Q11) was related to online assessments. It accounted for 5.153% of the total variance. There was not much variance in loading values of the three factors in the fourth component.

4.4.2 EFA of Part C: Needs for online Maritime English education

The Total Variance Explained shown in Table 4.16 revealed that four components, with eigenvalues exceeding 1, explained 40.534%, 8.591%, 6.248% and 5.731% of the variance respectively. These four components explained a cumulative percentage of 61.105% of the variance which is more than the minimum requirement of 50-60% of explained variance (Pallant, 2016).

Table 4. 16. *Total variance explained of Part C*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.296	40.534	40.534	7.296	40.534	40.534	5.701
2	1.546	8.591	49.125	1.546	8.591	49.125	5.350
3	1.125	6.248	55.373	1.125	6.248	55.373	3.702
4	1.032	5.731	61.105	1.032	5.731	61.105	3.979

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

The pattern matrix shown in Table 4.17 revealed that four components were extracted from the data of Part C. Although the small factor loadings of less than 0.3 had been suppressed, there were several cross-loaded factors with a minor difference (less than 0.2): Q35, Q39, and Q44. They were deleted as recommended with a strikethrough shown in Table 4.17.

Table 4. 17. *Pattern matrix of Part C*

	Component			
	1	2	3	4
Q46. I/ My students need training for online Maritime English study.	.898			
Q45. I/ My students need online devices provided by my institution to study Maritime English.	.811			
Q47. I/ My students need my institution to provide relevant support on online Maritime English study.	.792			
~~Q44. I/ My students need to use different online tools for Maritime English study.~~	~~.530~~			~~.368~~
Q43. I/ My students need online platforms to support Maritime English study.	.516			.315
Q48. In the online Maritime English study, I/ My students need to know where and how to obtain technical support.	.300			
Q41. I/ My students need synchronous online interactions for Maritime English study.		.890		
~~Q35. I need different types of online feedback to track my Maritime English progress, such as written, video or audio forms.~~	~~.344~~	~~.721~~	~~.385~~	
Q42. I/ My students need asynchronous online interactions for Maritime English study.		.635		
Q40. I/ My students need to interact with peers online for Maritime English study.	.345	.598		
Q37. I/ My students need online Maritime English materials of different levels.		.493		
~~Q39. I/ My students need to interact with teachers online for Maritime English study.~~	~~.348~~	~~.466~~		
Q34. I/ My students need many online assessments to track Maritime English learning progress.			.751	
Q33. I/ My students need online feedback for Maritime English assessments.			.720	
Q32. I/ My students need multiple types of online assessments for Maritime English courses.			.699	.345
Q31. I/ My students need online assessments of Maritime English.			.630	.422
Q36. I/ My students prefer online Maritime English materials to paper-based materials.				.900
Q38. I/ My students need online Maritime English materials in multiple forms.				.384

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

The initial EFA of Part C shown in Table 4.17 led to the removal of three items as recommended and the factor loading for each item could be slightly changed as a result. So the EFA of the remaining items was conducted. The values of the KMO and statistical significance did not change much, representing 0.876 and 0.000 respectively. Similarly, the four components explained 66.785% of the total variance, with corresponding values of 42.190%, 9.900%, 7.732% and 6.962%. Table 4.18 shows a clear structure of Part C with

four components. Compared to the initial EFA of Part C, the change is that Q37 has been relocated from component 2 to component 4 where it belongs. The factor loadings of Q37 and Q38 have been improved.

Table 4. 18. *Pattern matrix of Part C after deleting inappropriate items*

	Component			
	1	2	3	4
Q34. I/ My students need many online assessments to track my Maritime English learning progress.			.847	
Q32. I/ My students need multiple types of online assessments for my Maritime English courses.			.800	
Q33. I/ My students need online feedback for my Maritime English assessments.			.664	
Q31. I/ My students need online assessments of Maritime English.			.615	
Q36. I/ My students prefer online Maritime English materials to paper-based materials.				.826
Q37. I/ My students need online Maritime English materials of different levels.				.704
Q38. I/ My students need online Maritime English materials in multiple forms.				.658
Q42. I/ My students need asynchronous online interactions for my Maritime English study.		.863		
Q41. I/ My students need synchronous online interactions for my Maritime English study.		.819		
Q40. I/ My students need to interact with peers online for my Maritime English study.		.731		
Q46. I/ My students need training for online Maritime English study.	.802			
Q47. I/ My students need my institution to provide relevant support on my online Maritime English study.	.781			
Q45. I/ My students need online devices provided by my institution to study Maritime English.	.712			
Q43. I/ My students need online platforms to support my Maritime English study.	.658			
Q48. In the online Maritime English study, I/ My students need to know where and how to obtain technical support.	.361			

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The first component (Q 31, Q32, Q33 and Q34) was related to the needs for online assessment and feedback. Q31, Q32, and Q34 were associated with online assessment and Q33 with online feedback. The highest factor loadings in this component were Q34 and Q32 with 0.847 and 0.800 respectively. The second component which was composed of Q36, Q37, and Q38 was mainly related to the online materials. This component accounted for 9.900% of the total variance. The factors (Q40, Q41, and Q42) in the third component were about online

interactions. It indicates that Q41 is the most important factor in component 3. The fourth component (Q43, Q45, Q46, Q47, and Q48) was related to related online support. Q46 with the highest loading can be regarded as the most important factor in this component.

4.4.3 EFA of Part D: Readiness for online Maritime English education

The Total Variance Explained shown in Table 4.19 revealed that three components, with eigenvalues exceeding 1, explained 39.004%, 8.395% and 7.695% of the variance respectively. These three components explained a cumulative percentage of 55.094% of the variance which exceeds the minimum requirement of 50-60% of explained variance (Pallant, 2016).

Table 4. 19. *Total variance explained of Part D*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.461	39.004	39.004	5.461	39.004	39.004	3.870
2	1.175	8.395	47.399	1.175	8.395	47.399	3.998
3	1.077	7.695	55.094	1.077	7.695	55.094	3.863

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

As shown in the pattern matrix of EFA in Table 4.20 three components were extracted in Part D. The components of Part D included 1) technical competence; 2) self-efficacy and self-management of online learning; and 3) motivation for online learning, which are slightly different from the originally planned factors for Part D. As recommended, the response item with factor loading less than the absolute value of 0.3 and cross-loaded items with little difference are not recommended for factor analysis (Guttman & Lawley, 1947). As such, three response items (Q52, Q53, and Q61) were deleted, as shown with a strikethrough in Table 4.20.

Table 4. 20. *Pattern matrix of Part D*

	Component		
	1	2	3
Q60. I/My students can understand the instructions on how to use online tools.	.859		
Q59. When encountering technical obstacles, I/my students can find ways to solve them.	.778		
Q57. I/My students have the necessary technical skills to support my online Maritime English study.	.637		
Q50. I/My students am/are confident to communicate Maritime English online with others.		.841	-.366
Q49. I/My students can adapt myself/themselves to online Maritime English learning.		.672	
Q62. I/My students can spend some spare time participating in the training on online learning.		.613	
~~Q61. I/My students can find relevant online resources to support Maritime English study.~~	~~.365~~	~~.425~~	
Q56. When studying online, I/my students am/are not easily distracted by other online activities.		.417	
Q54. I/My students am willing to share ideas with others online.			.872
Q51. Online learning can motivate me/ my students to study Maritime English.			.655
~~Q53. I/My students can seek assistance when facing online learning problems.~~	~~.449~~		~~.565~~
Q58. I/My students am/are willing to enhance my/their participation in Maritime English study by using online tools.		.311	.509
Q55. I/My students am/are autonomous in learning.		.303	.506
~~Q52. I/My students do not feel frustrated when facing technology-related obstacles.~~	~~.250~~		~~.293~~

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

As shown in Table 4.20, the first extracted component included three distinctive items (Q57, Q59, and Q60) regarding technical competence. The second component was composed of Q49, Q50, Q55, Q56, and Q62, which was mainly related to self-efficacy and self-management of online learning. The third component (Q51, Q54, and Q58) was related to motivation for online learning.

4.5 Structural Equation Modelling (SEM)

SEM can be seen as an extension of factor analysis by testing a substantive theory from empirical data (Sinharay, 2010). SPSS Amos is powerful SEM software used to show the strength of the interrelationships between multilevel variables and test hypotheses on complex variable relationships (IBM, 2018). In this research, SEM Amos (Version 24.0) was used to test the proposed model produced by EFA in the previous sections.

Figure 4.1 shows the correlation between observed variables and their latent construct. An observed variable that has a weak relationship with the corresponding latent construct can be considered to be removed, i.e., any standardised regression weight of less than 0.6 (Zainudin, 2012). In this research, the results show that there were no weak relationships between the observed variables and their corresponding latent constructs with the standardised regression weight ranging from 0.61 to 0.85. Therefore, the model fit of this instrument is reasonable.

For the current status of online Maritime English education, the observed variable of online interactions had a relatively weak relationship with a factor loading of 0.66. It indicates that there were fewer respondents who agreed that there were online interactions for Maritime English learning. By contrast, there were more respondents who agreed that there were online assessment and feedback with a factor loading of 0.85. In the construct of the needs, the respondents showed their relatively weak needs for online assessment and feedback with a factor loading of 0.62. They showed a relatively strong need for related online support. This can be partly reflected in their responses to the readiness of online Maritime English education regarding technical competence with a factor loading of 0.61. Figure 4.1 also shows that the component of the current status of online Maritime English education had a weak correlation with the other two components: needs and readiness for online Maritime English education with factors loadings of 0.47 and 0.49 respectively. It indicates that the respondents had much higher agreement on needs and readiness for online Maritime English education compared to that on the current status of online Maritime English education.

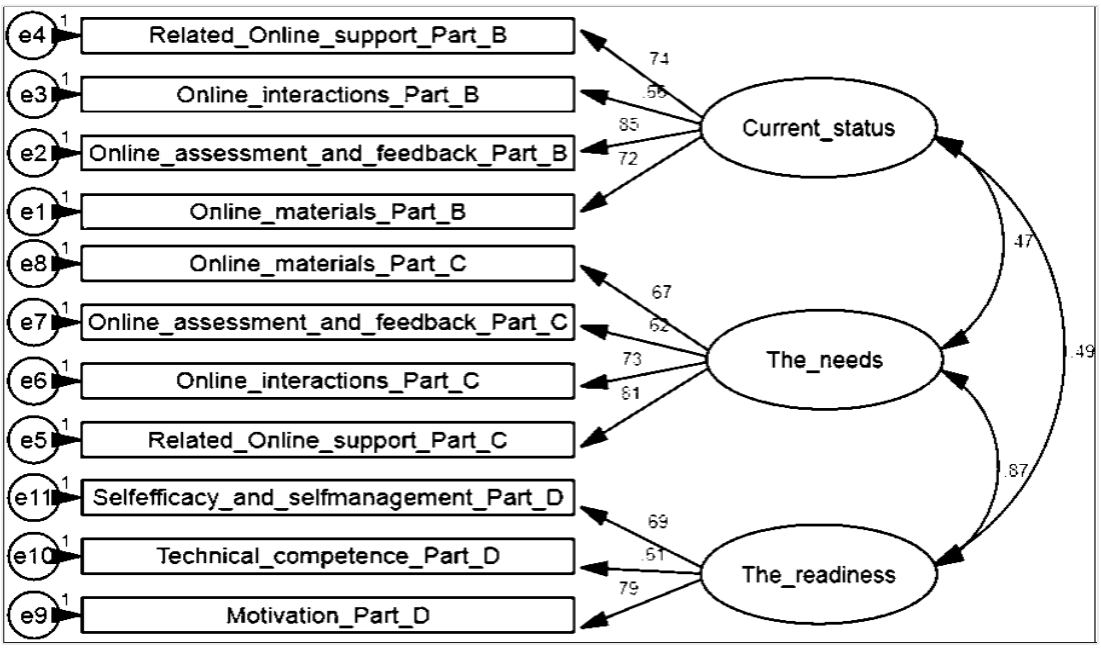

Figure 4. 1. Path diagram of the measurement model regarding online Maritime English education

SEM evaluation is based on absolute model fit indices. Maximum likelihood was used and adequacy of overall model fit was assessed using five fit indices including the following: Comparative Fit Index (CFI) which should be close to 0.95 or higher, Non-Normed Fit Index (NNFI, also known as TLI) which should be close to 0.90 or higher, Root Mean Square Error of Approximation (RMSEA) which should be less than 0.06, and normed Chi-square (CMIN/df) which should be less than 2 (Chou, Boldy, & Lee, 2002; Schreiber, Nora, Stage, Barlow, & King, 2006). A good model fit can be achieved when the majority of the indices meet their requirements (Hooper, Coughlan, & Mullen, 2008). In this research, the absolute fit indices presented a satisfactory result according to these model fit criteria. In this research, the values for CFI, TLI, RMSEA and CMIN/df were 0.972, 0.963, 0.054 and 1.670. The detail of summary of the Model Fit can be found in Appendix 6.

4.6 Internal reliability of the questionnaires

4.6.1 Internal reliability of Part B: Current status of online Maritime English education

For the internal reliability, the value of Cronbach's Alpha greater than 0.7 is acceptable (Wessmann, Volk, Parkin, Ortega, & Anderson, 2014) and the values above 0.8 are preferable (Pallant, 2016). As shown in Table 4.21, the Alpha value for each construct

(component) is above 0.70. It indicates good reliability of the measurement for Part B: the current situation of online Maritime English education.

Table 4. 21. *The final structure and reliability of the four components of Part B*

Components	Measuring Items	Factor loading	Alpha> 0.5~0.7
1. Related online support	Q25. I/ My students am/ are allowed to use some online tools provided by my institution to study Maritime English.	.776	**.842**
	Q24. The online tools provided by my institution perform stably in the process of my Maritime English education.	.743	
	Q27. My institution provides training on how to use online tools for my Maritime English education.	.724	
	Q30. Other than the resources provided in the class, my institution provides some forms of peripheral support for my Maritime English education.	.715	
	Q28. My institution provides technical support for my online Maritime English education.	.637	
	Q23. My institution provides online tools for my Maritime English education.	.566	
	Q26. Online tools used in my Maritime English courses enhance my/my students' motivation in learning.	.435	
2. Online interactions	Q20. I/ My students interact online asynchronously with others for Maritime English study.	.912	**.836**
	Q19. I/ My students interact online synchronously with others for Maritime English study.	.908	
	Q18. I/ My students interact with peers online for Maritime English study.	.748	
	Q17. I interact with my Maritime English teachers/my maritime students online for Maritime English study.	.669	
3. Online feedback and materials	Q12. The feedback of assessment is provided to me/my students via online methods.	.644	**.749**
	Q14. Some online learning materials are provided in my Maritime English courses.	.629	
	Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms.	.605	
	Q16. Various forms of Maritime English learning materials are provided to me/my students via online methods.	.586	
	Q15. The provided online learning materials to me/my students are appropriate to my/my students' English level.	.532	
	Q22. The online interactions conducted for Maritime English studies improved my/my students' Maritime English level.	.418	
4. Online assessment	Q10. Varied online assessments are used in my/my students' Maritime English study, such as informal self-evaluation or formal ones.	.656	**.726**
	Q9. Online assessments are used in my Maritime English courses.	.635	
	Q11. The current online assessments can measure my/my students' learning from different aspects.	.526	

4.6.2 Internal reliability of Part C: Needs for online Maritime English education

The internal reliability analysis in Table 4.22 shows that the Cronbach's Alpha value for each component in Part C is 0.782 and 0.815, 0.749 and 0.682. A Cronbach's Alpha value of 0.70 and above is suggested as the criterion for demonstrating internal consistency (Pallant, 2016). However, the Cronbach's Alpha value could be quite small when the number of items in the scale is fewer than ten (Pallant, 2016). In such case, it would be better to take the mean inter-item correlation into account (Pallant, 2016). Clark and Watson (1995) recommended that the mean inter-item correlation values range from 0.15—0.5. Therefore, for component 4, online materials, the Cronbach's Alpha value is 0.682 which could be acceptable since there are only 3 items in this component and the mean inter-item correlation is 0.438 which falls in the suggested range of 0.15—0.5 (see Table 4.23).

Table 4. 22. *The final structure and reliability of the four components of Part C*

Components	Measuring Items	Factor loading	P-Value	Alpha> 0.5~0.7
1. Related online support	Q46. I/ My students need training for online Maritime English study.	.802	<0.001	.782
	Q45. I/ My students need online devices provided by my institution to study Maritime English.	.781	<0.001	
	Q47. I/ My students need my institution to provide relevant support on online Maritime English study.	.712	<0.001	
	Q43. I/ My students need online platforms to support Maritime English study	.662	<0.001	
	Q48. In the online Maritime English study, I/ My students need to know where and how to obtain technical support.	.361	<0.001	
2. Online interactions	Q42. I/ My students need asynchronous online interactions for Maritime English study.	.863	<0.001	.815
	Q41. I/ My students need synchronous online interactions for Maritime English study.	.819	<0.001	
	Q40. I/ My students need to interact with peers online for Maritime English study.	.731	<0.001	
3. Online assessment and feedback	Q34. I/ My students need many online assessments to track Maritime English learning progress.	.847	<0.001	.749
	Q32. I/ My students need multiple types of online assessments for Maritime English courses.	.800	<0.001	
	Q33. I/ My students need online feedback for Maritime English assessments.	.664	<0.001	
	Q31. I/ My students need online assessments of Maritime English.	.639	<0.001	
4. Online materials	Q36. I/ My students prefer online Maritime English materials to paper-based materials.	.826	<0.001	.682
	Q38. I/ My students need online Maritime English materials in multiple forms.	.658	<0.001	
	Q37. I/ My students need online Maritime English materials of different levels.	.704	<0.001	

Table 4. 23. *Summary Item Statistics for component 4: online materials*

	Mean	Minimum	Maximum	Range	Maximum/ Minimum	Variance	N of Items
Item Means	3.776	3.437	3.978	.541	1.158	.087	3
Inter-Item Correlations	.438	.356	.562	.206	1.578	.010	3

4.6.3 Internal reliability of Part D: Readiness for online Maritime English education

Table 4.24 shows the final structure and reliability of Part D which is related to readiness for online Maritime English education. The internal reliability analysis shows that the Cronbach's Alpha value for each component is 0.733 and 0.674 and 0.698. Although the Alpha values of components 2 and 3 are below 0.70, as discussed in the previous section, they are acceptable since their mean inter-item correlation values are within the range 0.15—0.5 (see Table 4.25 and Table 4.26).

Table 4. 24. *The final structure and reliability of the four components of Part D*

Components	Measuring Items	Factor loading	P-Value	Alpha> 0.5~0.7
1. Technical competence	Q60. I/My students can understand the instructions on how to use online tools.	.859	<0.001	.733
	Q59. When encountering technical obstacles, I/my students can find ways to solve them.	.778	<0.001	
	Q57. I/My students have the necessary technical skills to support my online Maritime English study.	.637	<0.001	
2. Self-efficacy and self-management	Q50. I/My students am/are confident to communicate Maritime English online with others.	.841	<0.001	.674
	Q49. I/My students can adapt myself/themselves to online Maritime English learning.	.672	<0.001	
	Q62. I/My students can spend some spare time participating in the training on online learning.	.613	<0.001	
	Q56. When studying online, I/my students am/are not easily distracted by other online activities.	.417	<0.001	
	Q55. I/My students am/are autonomous in learning.	.401	<0.001	
3. Motivation	Q54. I/My students am/are willing to share ideas with others online.	.872	<0.001	.698
	Q51. Online learning can motivate me/my students to study Maritime English.	.655	<0.001	
	Q58. I/My students am/are willing to enhance my/their participation in Maritime English study by using online tools.	.509	<0.001	

Table 4. 25. *Summary Item Statistics of component 2: self-efficacy and self-management*

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.407	3.211	3.625	.414	1.129	.045	5
Inter-Item Correlations	.349	.274	.382	.108	1.395	.002	5

Table 4. 26. *Summary Item Statistics of component 3: motivation and participation*

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.683	3.563	3.784	.221	1.062	.012	3
Inter-Item Correlations	.440	.429	.460	.031	1.073	.000	3

4.6.4 Internal reliability of the whole questionnaires

The questionnaires investigating online Maritime English education in China consist of three parts: Part B, Part C and Part D. Four components were extracted through EFA for both Part B and Part C: 1) related online support; 2) online interactions; 3) online assessment and feedback; and 4) online materials. Part D has three components extracted with EFA: 1) technical competence; 2) self-efficacy and self-management; and 3) motivation. In total, 11 components or constructs were extracted with EFA for the measurement tool regarding online Maritime English education in China. With EFA, the whole measurement tool retained 46 measuring items from the initial 54 measuring items. The removed items are Q21, Q29, Q35, Q39, Q44, Q52, Q53, and Q61. Table 4.27 presents the final structure and reliability of the measurement tool for the online Maritime English education in China.

Table 4. 27. *The final structure and reliability of the measurement tool for the online Maritime English education in China*

Parts	Components	Measuring Items	Alpha> 0.5~0.7	Alpha> 0.70
Part B	1. Related online support	Q25. I/ My students am/ are allowed to use some online tools provided by my institution to study Maritime English.	.842	.904
		Q24. The online tools provided by my institution perform stably in the process of my Maritime English education.		
		Q27. My institution provides training on how to use online tools for my/ my students' Maritime English study.		
		Q30. Other than the resources provided in the class, my institution provides some forms of peripheral support for my/my students' Maritime English study.		
		Q28. My institution provides technical support for my online Maritime English education.		
		Q23. My institution provides online tools for my Maritime English education.		
		Q26. Online tools used in my Maritime English courses enhance my/my students' motivation in learning.		
	2. Online interactions	Q20. I/ My students interact online asynchronously with others for my Maritime English study.	.836	
		Q19. I/ My students interact online synchronously with others for my Maritime English study.		
		Q18. I/ My students interact with peers online for Maritime English study.		
		Q17. I/ My students interact with my Maritime English teachers online for Maritime English study.		
	3. Online assessment and feedback	Q12. The feedback of assessment is provided to me/ my students via online methods.	.749	
		Q14. Some online learning materials are provided in my Maritime English courses.		
		Q13. Diverse types of online feedback are provided to me/ my students, such as in written, video or audio forms.		
		Q16. Various forms of Maritime English learning materials are provided to me/ my students via online methods.		
		Q15. The provided online learning materials to me/ my students are appropriate to my/ my students' English level.		
		Q22. The online interactions conducted for Maritime English studies improved my/ my students' Maritime English level.		
	4. Online materials	Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	.726	
		Q9. Online assessments are used in my Maritime English courses.		
		Q11. The current online assessments can measure my / my students' Maritime English learning from different aspects.		
Part C	5. Related online	Q46. I/My students need training for online Maritime English study.	.782	.877
		Q45. I/My students need online devices provided by my institution to		

	support	study Maritime English.		
		Q47. I/My students need my institution to provide relevant support on online Maritime English study.		
		Q43. I/My students need online platforms to support Maritime English study		
		Q48. In the online Maritime English study, I/my students need to know where and how to obtain technical support.		
	6. Online interactions	Q41. I/My students need synchronous online interactions for Maritime English study.	.815	
		Q42. I/My students need asynchronous online interactions for Maritime English study.		
		Q40. I/My students need to interact with peers online for Maritime English study.		
	7. Online assessment and feedback	Q34. I/My students need many online assessments to track Maritime English learning progress.	.749	
		Q32. I/My students need multiple types of online assessments for Maritime English courses.		
		Q33. I/My students need online feedback for Maritime English assessments.		
		Q31. I/My students need online assessments of Maritime English.		
	8. Online materials	Q36. I/My students prefer online Maritime English materials to paper-based materials.	.682	
		Q38. I/My students need online Maritime English materials in multiple forms.		
		Q37. I/My students need online Maritime English materials of different levels.		
Part D	9. Technical competence	Q60. I/My students can understand the instructions on how to use online tools.	.733	.827
		Q59. When encountering technical obstacles, I/my students can find ways to solve them.		
		Q57. I/My students have the necessary technical skills to support my/their online Maritime English study.		
	10. Self-efficacy and self-management	Q50. I/My students am/are confident to communicate Maritime English online with others.	.674	
		Q49. I/My students can adapt myself/themselves to online Maritime English learning.		
		Q62. I/My students can spend some spare time participating in the training on online learning.		
		Q56. When studying online, I/my students am/are not easily distracted by other online activities.		
		Q55. I/My students am/are autonomous in learning.		
	11. Motivation	Q54. I/My students am/are willing to share ideas with others online.	.698	
		Q51. Online learning can motivate me/my students for studying.		
		Q58. I/My students am/are willing to enhance my/their participation in Maritime English study by using online tools.		

4.7 Factors that influence the participants' opinions

This section reports the factors that influenced the respondents' opinions. Kruskal-Wallis or Mann-Whitney U tests were performed on the individual questions and 11 components obtained from the EFA respectively. The individual questions included Q10, Q12, Q13, Q50, Q55 and Q56, each of which had a relatively low score of median and percentage of agreement. This part explored the factors that influenced the participants' choices on specific issues. The 11 components obtained from the EFA were analysed in this part as well in order to figure out the potential influencing factors. The nine independent values: the participants' occupation (Maritime English teacher or maritime student), students' educational qualification, students' major, students' grade, dominant teaching mode, the employment of online learning platform, students' Maritime English ability, online experience, and class size were performed on each question and component to determine which of them were associated with their views. It should be aware that there were a limited number of the participants who were in "the 5th grader or higher". In the Kruskal-Wallis and Mann-Whitney U test, the data of this group were just calculated for a reference purpose. The whole quantitative analysis results are shown in the following sections.

4.7.1 Participants' occupation

The results of Kruskal-Wallis tests presented in Table 4.28 show the significance level is 0.024 which is less than 0.05. Therefore, there was a significant association between the participants' occupation and the statement "Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms". Mann-Whitney U tests were used to determine where the significant difference lies between the groups (Pallant, 2016). While p-value indicates whether an effect exists, it does not reveal the magnitude of the effect (Sullivan & Feinn, 2012). For this reason, the effect size is reported in this research to obtain a standardised measure of the size. There are several different indexes for effect size (Pallant, 2016). In this research, Cohen's d was adopted to calculate this value. According to Cohen (1988), the interpretation of the values of Cohen's d is: 1.3=very large, 0.8=large, 0.5=medium and 0.2=small.

Table 4. 28. *Kruskal-Wallis test on Q13 by Occupation*

	Occupation	N	Mean Rank	Median
Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms	Maritime English teacher	21	160.76	3
	Maritime students	234	125.06	2
	Total	255		2
Chi-Square= 5.087, df =1, p-value = 0.024<0.05				

Follow-up Mann-Whitney U tests indicate that Maritime English teachers were more likely to agree with this statement than maritime students did. Cohen's d value of 0.490 is considered as a medium effect size.

• Maritime English teachers and Maritime students (U=1769.000, Z=-2.255, Cohen's d=0.490, p-value =0.024<0.05)

Table 4.29 indicates that there was a statistically significant difference between the participants' occupation and the view that "When studying online, I/my students am/are not easily distracted by other online activities". An examination of the mean ranks indicates that the maritime students (mean rank=133.38) held a more positive attitude towards this statement than Maritime English teachers (mean bank=68.05) did. Cohen's d value of 1.02 is believed to be a very large effect size.

Table 4. 29. *Kruskal-Wallis test on Q56 by Occupation*

	Occupation	N	Mean Rank	Median
Q56. When studying online, I/my students am/are not easily distracted by other online activities.	Maritime English teachers	21	68.05	2
	Maritime students	234	133.38	3
	Total	255		3
Chi-Square= 16.356, df =1, p-value = 0.000<0.05				

After Kruskal-Wallis tests and Mann-Whitney U tests were performed on individual questions, these tests were conducted on the 11 components obtained from above EFA. The 11 components are: 1. related online support, 2. online interactions, 3. online assessment and feedback and 4. online materials in Part B; 5. related online support, 6. online interactions, 7. online assessment and feedback and 8. online materials in Part C and 9. technical competence, 10. self-efficacy and self-management, 11. motivation and participation in Part D.

The results of Kruskal-Wallis tests show that both Maritime English teachers and maritime students reached a general agreement on all components except needs for online interactions (p-value =0.038<0.05) and readiness for technical competence (p-value=0.009<0.05). The results are shown in Table 4.30 and Table 4.31.

Table 4. 30. *Kruskal-Wallis test on Component 6 by Occupation*

	Occupation	N	Mean Rank
Online_interactions _Part_C	Maritime English teachers	21	159.71
	Maritime students	234	125.15
	Total	255	
Chi-Square= 4.304, df =1, p-value = 0.038<0.05			

Table 4. 31. *Kruskal-Wallis test on Component 9 by Occupation*

	Occupation	N	Mean Rank
Technical_competence _Part_D	Maritime English teachers	21	88.14
	Maritime students	234	131.58
	Total	255	
Chi-Square= 6.760, df =1, p-value = 0.009<0.05			

Specifically, Maritime English teachers had a higher degree of agreement on the needs for online interactions (mean bank=159.71) than students (mean bank=125.15). It indicates that Maritime English teachers thought more online interactions were needed for Maritime English studies than maritime students. As for technical competence, students had a higher degree of agreement on this factor (mean bank=131.58) than Maritime English teachers did (mean bank=88.14).

4.7.2 Students' educational qualification

In the output presented in Table 4.32, the significance level is 0.03 which was less than 0.05. Therefore, the result suggests that there was a significant difference in the varied online assessments across students studying for different educational qualifications. An examination of the mean ranks indicates that the group studied for "A vocational certificate" (mean rank = 160.42) was most probably provided with multiple online assessments, while group studied for "An associate degree" (mean rank = 117.81) was the least likely.

Table 4. 32. *Kruskal-Wallis test on Q10 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank	Median
Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	A vocational certificate	12	160.42	3
	An associate degree	135	117.81	2
	A Bachelor's degree	108	137.13	3
	Total	255		2
Chi-Square= 7.026, df =2, p-value = 0.030<0.05				

For students' educational qualification, the results of Mann-Whitney U tests indicate that no difference existed between the groups of students studying for "A vocational certificate" and "A bachelor's degree" (U=531.500, Z=-1.055, p-value =0.292>0.05). However, a statistical significance was found between the groups of "A vocational certificate" and "An associate degree", and between "An associate degree" and "A bachelor's degree". The results are shown as follows:

• A vocational certificate and An associate degree (U=537.500, Z=-1.999, Cohen's d=0.593, p-value =0.046<0.05)

• An associate degree and A bachelor's degree (U=6187.500, Z=-2.100, Cohen's d =-0.280, p-value =0.036<0.05)

The Kruskal-Wallis test performed on Q12 by students' educational qualification (see Table 4.33) indicates there was a significant difference between groups of students by educational qualification regarding their agreement with the statement "Feedback of assessment is provided to me/my students via online methods".

Table 4. 33. *Kruskal-Wallis test on Q12 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank	Median
Q12. Feedback of assessment is provided to me/my students via online methods.	A vocational certificate	12	126.67	3
	An associate degree	135	112.59	2
	A bachelor's degree	108	147.41	3
	Total	255		2
Chi-Square= 14.296, df =2, p-value= 0.001<0.05				

In order to further analyse which group is different from the others, a Mann-Whitney U test was conducted on Q12 by students' educational qualification. No significant differences were found in online feedback of assessment between the groups of "A vocational certificate" and "An associated degree" (U=722.000, Z=-0.648, p-value=0.517>0.05), and between the groups of "A vocational degree" and "A bachelor's degree" (U=544.000, Z=-0.941, p-value=0.347>0.05). However, statistically significant differences were found between the groups of "An associate degree" and "A bachelor's degree". The mean rank values indicate that the participants from "An associate degree" (mean rank=112.59) were the least likely to agree there was online feedback provided for their Maritime English study while the ones from "A bachelor's degree" were the most likely to agree on this issue among the three groups (mean rank=147.41).

- An associate degree and A bachelor's degree (U=5298.000, Z=-3.781, Cohen's d=-0.507, p-value=0.000<0.05).

The results presented in Table 4.34 show there were statistically significant differences between groups of students by educational qualification regarding their views towards the provision of diverse types of online feedback. The results of Mann-Whitney U tests conducted on Q13 by students' educational qualification indicated that there was no difference in the responses between the groups of "A vocational certificate" and "A bachelor's degree" (U=449.000, Z=-1.836, p-value=0.066>0.05). However, statistically significant differences were found between the following groups:

- A vocational certificate and An associate degree (U=405.000, Z=-3.048, Cohen's d=0.999, p-value=0.002<0.05).

- An associate degree and A bachelor's degree (U=5663.000, Z=-3.184, Cohen's d=-0.440, p-value=0.001<0.05).

An inspection of the mean ranks shows that the most significant difference lied between the group of "A vocational certificate" and "An associate degree". The former group (mean rank=178.33) was more likely to report the use of diverse forms of online feedback than the latter group (mean rank=112.95) did.

Table 4. 34. *Kruskal-Wallis test on Q13 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank	Median
Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms.	A vocational certificate	12	178.33	3.5
	An associate degree	135	112.95	2
	A bachelor's degree	108	141.22	2
	Total	255		2
Chi-Square=16.541, df=2, p-value=0.000<0.05				

The results of Kruskal-Wallis tests performed on the 11 components by students' educational qualification show that there were statistically significant differences in the views towards the current situation of related online support (p-value =0.001<0.05), online assessment and feedback (p-value =0.000<0.05) and the needs for related online support (p-value =0.037<0.05). The results are shown in Table 4.35, Table 4.36 and Table 4.37.

Table 4. 35. *Kruskal-Wallis test on Component 1 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank
Related_online_support_Part_B	A vocational certificate	12	141.54
	An associate degree	135	111.10
	A bachelor's degree	108	147.62
	Total	255	
Chi-Square=15.133, df=2, p-value=0.001<0.05			

The results of Mann-Whitney U tests conducted on Component 1 by students' educational qualification indicated that there was no difference in the responses between the groups of "A vocational certificate" and "An associate degree" (U=615.500, Z=-1.376, p-value=0.169 >0.05), and the groups of "A vocational certificate" and "A bachelor's degree" (U=616.000, Z=-0.280, p-value=0.780 >0.05). Statistically significant differences were found between the following groups:

• An associate degree and A bachelor's degree (U=5203.500, Z=-3.833, Cohen's d =0.557, p-value=0.000<0.05).

Specifically, the maritime students who were pursuing an associate degree (mean rank=111.10) had significantly more negative views towards the issues related to the current status of online support than students for a bachelor's degree (mean rank=147.62). The value of Cohen's d indicates the effect size is relatively large.

Table 4. 36. *Kruskal-Wallis test on Component 3 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank
Online_assessment_and_feedback_Part_B	A vocational certificate	12	152.96
	An associate degree	135	106.08
	A bachelor's degree	108	152.63
	Total	255	
Chi-Square=25.345, df=2, p-value=0.000<0.05			

Mann-Whitney U tests conducted on Component 3 by students' educational qualification indicated that there was no difference in the responses between the groups of "A vocational certificate" and "A bachelor's degree" (U=641.500, Z=-0.057, p-value=0.955>0.05). Statistically significant differences were found between the following groups:

• A vocational certificate and An associate degree (U=517.000, Z=-2.073, Cohen's d =0.644, p-value=0.038<0.05).

• An associate degree and A bachelor's degree (U=4623.500, Z=-4.897, Cohen's d =0.715, p-value=0.000<0.05).

The results show that students pursuing an associate degree had the lowest agreement rates on the issues related to the current status of online assessment and feedback. The values of Cohen's d indicate the effect sizes between the groups studying for an associate degree and other groups are relatively large.

Table 4. 37. *Kruskal-Wallis test on Component 5 by Students' educational qualification*

	Students' educational qualification	N	Mean Rank
Related_online_support_Part_C	A vocational certificate	12	118.96
	An associate degree	135	117.81
	A bachelor's degree	108	141.75
	Total	255	
Chi-Square=6.612, df=2, p-value=0.037<0.05			

The results of Mann-Whitney U tests conducted on Component 5 by students' educational qualification indicated that there was no difference in the responses between the groups of "A vocational certificate" and "An associate degree" (U=796.500, Z=-0.097, p-value=0.923 >0.05), and the groups of "A vocational certificate" and "A bachelor's degree"

(U=526.000, Z=-1.073, p-value=0.283 >0.05). Statistically significant differences were found between the following groups:

• An associate degree and A bachelor's degree (U=5927.500, Z=-2.520, Cohen's d =0.327, p-value=0.012<0.05).

The results mean students pursuing an associate degree (mean rank=117.81) had a weaker needs in online support than students for a bachelor's degree (mean rank=141.75).

4.7.3 Students' major

The results in Table 4.38 indicate that there was a significant difference between the Navigation and Maritime Engineering participants in terms of varied forms of online assessments. After Mann-Whitney U tests were conducted on Q10 by students' major, significant differences were found between the groups of Navigation and Marine Engineering. Table 4.38 shows that students of Navigation major (mean rank=136.10) varied from students of Marine Engineering (mean rank=105.28).

• Navigation and Marine Engineering (U=4776.000, Z=-3.042, Cohen's d=0.450, p-value =0.002<0.05).

The values of mean rank and median suggest that the Navigation group (mean rank= 136.10) were more likely to be provided with varied online assessments than the Marine Engineering group (mean rank = 105.28). Cohen's d value of 0.450 is considered as a medium effect size.

Table 4. 38. *Kruskal-Wallis test on Q10 by Students' major*

	Students' major	N	Mean Rank	Median
Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	Navigation	188	136.10	3
	Marine Engineering	67	105.28	2
	Total	255		2
Chi-Square= 9.252, df =1, p-value = 0.002<0.05				

Q50 regarding students' major (see Table 4.39) with a p-value of 0.026, indicates that there existed significant differences between students of different majors regarding their agreement on the statement "I/ My students am/are confident in communicating Maritime English online with others". The mean rank values show that Navigation students (mean rank=133.35) were

more confident in communicating Maritime English online than Marine Engineering students (mean rank=111.16).

Mann-Whitney U tests conducted on Q50 by students' major, and differences were found between the groups of Navigation and Marine Engineering:

• Navigation and Marine Engineering (U=5170.000, Z=-2.228, Cohen's d=0.319, p-value =0.026<0.05)

Table 4. 39. *Kruskal-Wallis test on Q50 by Students' major*

	Students' major	N	Mean Rank	Median
Q50. I/My students am/are confident in communicating Maritime English online with others.	Navigation	187	133.35	4
	Marine Engineering	67	111.16	3
	Total	254		3
Chi-Square=4.962, df =1, p-value = 0.026<0.05				

Table 4.40 shows that the significance level was 0.041, which was less than 0.05; thus, it indicates that there was a statistically significant difference between groups of students by majors regarding their agreement with the statement "I/My students am/are autonomous in learning". The mean rank in Table 4.40 also shows that the participants from Marine Engineer major (mean rank=143.28) held a more positive view of their autonomy in learning than those who were from Navigation (mean rank=122.56). Mann-Whitney U tests were conducted to examine where the significant difference lay.

• Navigation and Marine Engineering (U=5274.500, Z=-2.042, Cohen's d=0.304, p-value =0.041<0.05)

Table 4. 40. *Kruskal-Wallis test on Q55 by Students' major*

	Students' major	N	Mean Rank	Median
Q55. I/My students am/are autonomous in learning.	Navigation	188	122.56	3
	Marine Engineering	67	143.28	3
	Total	255		3
Chi-Square=4.170, df =1, p-value = 0.041<0.05				

The results of Kruskal-Wallis tests performed on the 11 components by students' major show that there existed no significant differences between Marine Engineering students and Navigation students in terms of all the components of measuring instrument.

4.7.4 Students' grade

The results in Table 4.41 indicate there was a statistical difference between groups of students by grade regarding their views towards the provision of varied online assessments. Mann-Whitney U tests performed on Q10 by students' grade show that there were differences between the following groups:

• The first year and The second year (U=2035.000, Z=-3.736, Cohen's d=0.636, p-value =0.000<0.05)

• The second year and The third year (U=2472.500, Z=-3.645, Cohen's d=-0.615, p-value =0.000<0.05)

The Mean Rank in Table 4.41 indicates that the second year students (mean rank=101.04) held a more negative view of Q10 than the first year students (mean rank=142.03) and the third year students did (mean rank=141.86). According to the values of Cohen's d, these groups both have a large effect size.

Table 4. 41. *Kruskal-Wallis test on Q10 by Students' grade*

	Students' grade	N	Mean Rank	Median
Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	the 1st year	76	142.03	3
	the 2nd year	80	101.04	2
	the 3rd year	90	141.86	3
	the 4th year	8	121.63	2
	the 5th year or higher	1	22.50	1
	Total	255		2
Chi-Square= 20.095, df =4, p-value = 0.000<0.05				

As shown in Table 4.42, there was a significant association between students' grade and the statement "Feedback of assessment is provided to me/my students via online methods". The results of Mann-Whitney U tests conducted on Q12 by students' grade indicate that significant differences existed in the participants' responses in the following groups:

• The first year and The second year (U=1935.500, Z=-4.076, Cohen's d=0.690, p-value=0.000<0.05).

• The second year and The third year (U=2530.500, Z=-3.453, Cohen's d=-0.564, p-value=0.001<0.05).

An inspection of the mean rank values suggests that students in “The second year” (mean rank = 100.86) had the lowest level of agreement on the statement that online feedback was provided for Maritime English study while students in “The first year” (mean rank =147.03) and “The third year” (mean rank =138.74) shared a relatively higher rate of agreement. Cohen's d values are 0.690 and 0.564 respectively, which are considered to be of large effect size.

Table 4. 42. *Kruskal-Wallis test on Q12 by Students’ grade*

	Students’ grade	N	Mean Rank	Median
Q12. Feedback of assessment is provided to me/my students via online methods.	the 1st year	76	147.03	3
	the 2nd year	80	100.86	2
	the 3rd year	90	138.74	3
	the 4th year	8	110.81	2
	the 5th year or higher	1	24.00	1
	Total	255		2
Chi-Square= 21.622, df =4, p-value= 0.000<0.05				

Table 4.43 suggests that the different students’ grades had a statistically significant association with the responses to Q13 (Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms). The results of Mann-Whitney U tests conducted on Q13 by students’ grade indicate that statistical differences existed between the following groups:

• The first year and The second year (U=2318.000, Z=-2.788, Cohen's d=0.418, p-value=0.005<0.05).

• The second year and The third year (U=2749.000, Z=-2.816, Cohen's d=-0.457, p-value=0.005<0.05).

The results of the mean rank suggest that students in the first year (mean rank = 137.03) and in the third year (mean rank=139.42) were more likely to agree with the statement that diverse types of online feedback were provided than the other two groups.

Table 4. 43. *Kruskal-Wallis test on Q13 by Students' grade*

	Students' grade	N	Mean Rank	Median
Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms.	the 1st year	76	137.03	2
	the 2nd year	80	108.20	2
	the 3rd year	90	139.42	2
	the 4th year	8	124.50	2
	the 5th year or higher	1	26.00	1
	Total	255		2
Chi-Square=12.384, df=4, p-value=0.015<0.05				

The results of Kruskal-Wallis tests performed on the 11 components by students' grade show that significant differences existed between marine students of different academic years in terms of the current situation of related online support (p-value =0.012<0.05), online assessment and feedback (p-value =0.000<0.05) and online materials (p-value =0.001<0.05). The results are shown in Table 4.44, Table 4.45 and Table 4.46.

Table 4.44 indicates that students' grades had a statistically significant association with the responses to the issues related to the current status of related online support. Mann-Whitney U tests performed on Component 1 by students' grade show that there were significant differences between the following groups:

• The first year and The second year (U=2109.000, Z=-3.302, Cohen's d=0.564, p-value =0.001<0.05)

• The second year and The third year (U=2906.000, Z=-2.167, Cohen's d=0.432, p-value =0.030<0.05)

An inspection of the mean rank values suggests that students in the second year of their studies (mean rank = 106.51) had the most negative views towards the issues related to the current status of related online support.

Table 4. 44. *Kruskal-Wallis test on Component 1 by Students' grade*

	Students' grade	N	Mean Rank
Related_online_support_Part_B	the 1st year	76	145.33
	the 2nd year	80	106.51
	the 3rd year	90	131.66
	the 4th year	8	147.00
	the 5th year or higher	1	49.00
	Total	255	
Chi-Square=12.888, df=4, p-value=0.012<0.05			

Table 4.45 shows the correlation between the variable of students' grade and the participants' views on the issues related to the current status of online assessment and feedback. The results of the mean rank suggest that students in the second year (mean rank = 95.26) had the most negative view towards this component compared to the other groups. Mann-Whitney U tests performed on Component 3 by students' grade show that there were significant differences between the following groups:

• The first year and The second year (U=1724.500, Z=-4.664, Cohen's d=0.847, p-value =0.000<0.05)

• The second year and The third year (U=2388.000, Z=-3.784, Cohen's d=-0.616, p-value =0.000<0.05)

Table 4. 45. *Kruskal-Wallis test on Component 3 by Students' grade*

	Students' grade	N	Mean Rank
Online_assessment_and_feedback_Part_B	the 1st year	76	149.26
	the 2nd year	80	95.26
	the 3rd year	90	139.26
	the 4th year	8	140.56
	the 5th year or higher	1	17.50
	Total	255	
Chi-Square=26.651, df=4, p-value=0.000<0.05			

Table 4.46 indicates there was a statistical difference between students' grade and their choices on the issues related to the current status of online materials. Again, students in grade two (mean rank = 103.62) held the most negative view of this component. Mann-Whitney U

tests performed on Component 4 by students' grade show that there were differences between the following groups:

• The first year and The second year (U=1963.000, Z=-3.823, Cohen's d=0.632, p-value =0.000<0.05)

• The second year and The third year (U=2849.500, Z=-2.345, Cohen's d=0.368, p-value =0.019<0.05)

• The second year and The fourth year (U=157.000, Z=-2.368, Cohen's d=1.053, p-value =0.018<0.05)

Table 4. 46. *Kruskal-Wallis test on Component 4 by Students' grade*

	Students' grade	N	Mean Rank
Online_materials _Part_B	the 1st year	76	147.84
	the 2nd year	80	103.62
	the 3rd year	90	131.25
	the 4th year	8	162.56
	the 5th year or higher	1	2.00
	Total	255	
Chi-Square=19.115, df=4, p-value=0.001<0.05			

4.7.5 Dominant teaching mode

The results of Kruskal-Wallis test (see Table 4.47) show that there existed a statistical significance between the participants whose Maritime English classes were taught mainly through traditional teaching methods and online methods in their responses to Q10 (Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones). The mean rank values of these two groups show that the latter group (mean rank=193.22) was more likely to report the provision of varied online assessments than the former one (mean rank=125.61) did.

• Traditional face-to-face with little or no online methods and Online methods (U=520.000, Z=-2.798, Cohen's d=-1.077, p-value= 0.005<0.05).

Table 4. 47. *Kruskal-Wallis test on Q10 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank	Median
Q10. Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	traditional face-to-face teaching	246	125.61	2
	online methods	9	193.22	4
	Total	255		2
Chi-Square= 7.829, df =1, p-value= 0.005<0.05				

Table 4.48 shows the correlation between different teaching methods and the participants' responses to the statement "Feedback of assessment is provided to me/my students via online methods". Mann-Whitney U tests show that there was a statistically significant difference between the "traditional face-to-face teaching" group and the "online methods" group. Table 4.48 shows students who were dominantly taught by traditional face-to-face teaching (mean rank=125.58) had a more negative point of view of this issue than those by online methods (mean rank=194.17). The value of Cohen's d suggests there is a very large effect size between the two groups.

• Traditional face-to-face teaching and Online methods (U=511.500, Z=-2.833, Cohen's d=1.229, p-value=0.005<0.05).

Table 4. 48. *Kruskal-Wallis test on Q12 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank	Median
Q12. Feedback of assessment is provided to me/my students via online methods.	traditional face-to-face teaching	246	125.58	2
	online methods	9	194.17	4
	Total	255		2
Chi-Square= 8.027, df =1, p-value= 0.005<0.05				

The analysis results of Kruskal-Wallis test shown in Table 4.49 suggest that there were statistically significant differences between the group whose Maritime English classes were dominated by "traditional face-to-face teaching" and the group whose classes were mainly taught through "online methods" in their responses to the statement "Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms". The medians and mean ranks presented in Table 4.49 indicate that the group of "the traditional face-to-face teaching" (mean rank=124.92) had a more negative view of this statement (mean rank=212.22) than the other group. In other words, students who were taught dominantly by the traditional teaching were less likely to report the provision of diverse types of online

feedback than those learning via online methods did. The value of Cohen's d between the two groups is 1.538, which indicates the effect size between the two groups is very large.

Table 4. 49. *Kruskal-Wallis test on Q13 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank	Median
Q13. Diverse types of online feedback are provided to me/my students, such as in written, video or audio forms.	traditional face-to-face teaching	246	124.92	2
	online methods	9	212.22	4
	Total	255		2
Chi-Square=13.705, df=1, p-value=0.000<0.05				

The results of Kruskal-Wallis test performed on the 11 components by dominant teaching mode show that there was a significant difference between the two groups of students with different teaching modes regarding all the four components related to the current situation of online Maritime English education in China. However, the test results show that there were no significant differences between the two groups in terms of the needs and readiness for online Maritime English education. The results are shown in Table 4.50, Table 4.51, Table 4.52 and Table 4.53. Generally, the participating group whose Maritime English was primarily taught by online methods had a significantly higher agreement on all the components in Part B than the group learning in the traditional face-to-face environment.

Table 4. 50. *Kruskal-Wallis test on Component 1 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank
Related_online_support_Part_B	traditional face-to-face teaching	246	125.93
	online methods	9	184.50
	Total	255	
Chi-Square=5.476, df=1, p-value=0.019<0.05			

Table 4. 51. *Kruskal-Wallis test on Component 2 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank
Online_interactions_Part_B	traditional face-to-face teaching	246	124.83
	online methods	9	214.72
	Total	255	
Chi-Square=12.927, df=1, p-value=0.000<0.05			

Table 4. 52. *Kruskal-Wallis test on Component 3 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank
Online_assessment_and_feedback_Part_B	traditional face-to-face teaching	246	124.25
	online methods	9	230.56
	Total	255	
Chi-Square=18.038, df=1, p-value=0.000<0.05			

Table 4. 53. *Kruskal-Wallis test on Component 4 by Dominant teaching mode*

	Dominant teaching mode	N	Mean Rank
Online_materials_Part_B	traditional face-to-face teaching	246	124.77
	online methods	9	216.17
	Total	255	
Chi-Square=13.349, df=1, p-value=0.000<0.05			

4.7.6 The employment of online learning platform

The results of Kruskal-Wallis tests performed on Q12 by the employment of online learning platform (see Table 4.54) show that there was a statistically significant difference between those with an online learning platform in their Maritime English education and those without in their responses to the statement “Feedback of assessment is provided to me/my students via online methods”. Although the median value of the responses from the participants who had an online learning platform was the same as those who had not (median=2), the mean rank values suggested that the participants who had an online learning platform (mean rank = 146.68) held a higher agreement on the investigated issue than those who had not (mean rank = 106.31).

- Yes and No (U=5523.500, Z=-4.506, Cohen's d=0.581, p-value=0.000<0.05).

Table 4. 54. *Kruskal-Wallis test on Q12 by the employment of online learning platform (EoOLP)*

	EoOLP	N	Mean Rank	Median
Q12. Feedback of assessment is provided to me/my students via online methods.	Yes	137	146.68	2
	No	118	106.31	2
	Total	255		2
Chi-Square= 20.307, df =1, p-value= 0.000<0.05				

Kruskal-Wallis tests show there was a significant association between the employment of online learning platform and all the components in Part B except for Component 3. Generally, the participants who employed an online learning platform in their Maritime English studies held a more positive view towards the issues related to the current status of related online support, online assessment and feedback and online materials. The results are shown in Table 4.55, Table 4.56 and Table 4.57.

Table 4. 55. *Kruskal-Wallis test on Component 1 by EoOLP*

	EoOLP	N	Mean Rank
Related_online_ support_Part_B	Yes	137	149.63
	No	118	102.89
	Total	255	
Chi-Square=25.465, df=1, p-value=0.000<0.05			

Table 4. 56. *Kruskal-Wallis test on Component 3 by EoOLP*

	EoOLP	N	Mean Rank
Online_assessment_and _feedback_Part_B	Yes	137	146.20
	No	118	106.87
	Total	255	
Chi-Square=18.022, df=1, p-value=0.000<0.05			

Table 4. 57. *Kruskal-Wallis test on Component 4 by EoOLP*

	EoOLP	N	Mean Rank
Online_materials _Part_B	Yes	137	138.09
	No	118	116.28
	Total	255	
Chi-Square=5.554, df=1, p-value=0.018<0.05			

4.7.7 Students' Maritime English ability

There was no significant difference between students of different Maritime English abilities regarding their responses to all of the selected questions. But the choices on the issues related to the current status of related online support (Component 1) and online assessment and feedback (Component 3) were significantly associated with students' Maritime English abilities. The results are shown in Table 4.58 and Table 4.59.

Table 4. 58. *Kruskal-Wallis test on Component 1 by Students' Maritime English ability (SMEA)*

	SMEA	N	Mean Rank
Related_online_support_Part_B	Very poor	40	92.10
	Poor	60	114.64
	Fair	126	141.31
	Good	23	136.83
	Excellent	6	187.58
	Total	255	
Chi-Square=19.799, df=4, p-value=0.001<0.05			

Mann-Whitney U tests performed on Component 1 by students' Maritime English ability show that there were differences between the following groups:

- Very poor and Fair (U=1520.500, Z=-3.774, Cohen's d=0.618, p-value =0.000<0.05)
- Very poor and Good (U=292.500, Z=-2.391, Cohen's d=-0.617, p-value =0.017<0.05)
- Very poor and Excellent (U=30.000, Z=-2.936, Cohen's d=-1.433, p-value =0.003<0.05)
- Poor and Fair (U=3011.500, Z=-2.239, Cohen's d=-0.332, p-value =0.025<0.05)
- Poor and Excellent (U=89.500, Z=-2.019, Cohen's d=-0.985, p-value =0.043<0.05)

The mean ranks of Table 4.58 indicate that students with very poor Maritime English ability (mean rank=92.10) had the most negative views towards issues related to the current status of related online support while students with excellent Maritime English held the most positive attitudes (mean rank=187.58).

Table 4. 59. *Kruskal-Wallis test on Component 3 by SMEA*

	SMEA	N	Mean Rank
Online_assessment_and_feedback_Part_B	Very poor	40	99.15
	Poor	60	112.87
	Fair	126	142.37
	Good	23	128.57
	Excellent	6	167.67
	Total	255	
Chi-Square=15.168, df=4, p-value=0.004<0.05			

Table 4.59 shows that maritime students with higher levels of English proficiency generally had a higher agreement on the statements related to the current status of online assessment and feedback. Mann-Whitney U tests performed on Component 3 by students' Maritime English ability show that there were differences between the following groups:

- Very poor and Fair (U=1672.000, Z=-3.202, Cohen's d=0.554, p-value =0.001<0.05)
- Very poor and Excellent (U=50.000, Z=-2.283, Cohen's d=-1.041, p-value =0.022<0.05)
- Poor and Fair (U=2915.500, Z=-2.519, Cohen's d=-0.381, p-value =0.012<0.05)

4.7.8 Online experience

It was found that online experience was associated with none of the selected questions. However, this factor was found significantly associated with Component 7. The results are shown in Table 4.60.

Table 4. 60. *Kruskal-Wallis test on Component 7 by Online experience*

	Online experience	N	Mean Rank
Online_assessment_and_feedback_Part_C	Less than 1 year	11	175.00
	1-3 years	53	108.38
	3-5 years	53	146.34
	5-8 years	75	122.14
	Over 8 years	62	125.80
	Total	254	
Chi-Square=12.349, df=4, p-value=0.015<0.05			

Mann-Whitney U tests performed on Component 7 by online experience show that there were differences between the following groups:

- Less than 1 year and 1-3 years (U=148.500, Z=-2.559, Cohen's d=0.933, p-value =0.010<0.05)
- Less than 1 year and 5-8 years (U=246.000, Z=-2.169, Cohen's d=-0.731, p-value =0.030<0.05)

• Less than 1 year and Over 8 years (U=203.000, Z=-2.163, Cohen's d=-0.746, p-value =0.031<0.05)

• 1-3 years and 3-5 years (U=979.500, Z=-2.715, Cohen's d=-0.490, p-value =0.007<0.05

4.7.9 Class size

Kruskal-Wallis tests conducted on Q12 by class size (see Table 4.61) show the correlation between different class sizes and the participants' responses to the view "Feedback of assessment is provided to me/my students via online methods". Mann-Whitney U tests were performed between all the groups of different class sizes to investigate which groups were statistically different regarding whether there was online feedback provided for Maritime English study. Results showed that the following groups demonstrated significant differences:

• 21-30 students and 41-50 students (U=902.000, Z=-3.028, Cohen's d=-0.602, p-value=0.002<0.05).

• 21-30 students and More than 50 students (U=881.000, Z=-2.200, Cohen's d=-0.451, p-value=0.028<0.05).

• 31-40 students and 41-50 students (U=2265.500, Z=-2.693, Cohen's d=-0.432, p-value=0.007<0.05).

Generally, the participants from smaller class sizes held a lower agreement on the statement of "the feedback is provided to students via online methods" (mean rank of "21-30 students"=105.35, mean rank of "31-20 students"=116.52) than those from larger class sizes (mean rank of "41-50 students"=147.46, mean rank of "More than 50 students"=138.06).

Table 4. 61. *Kruskal-Wallis test on Q12 by Class size*

	Class size	N	Mean Rank	Median
Q12. Feedback of assessment is provided to me/my students via online methods.	21-30 students	40	105.35	2
	31-40 students	88	116.52	2
	41-50 students	68	147.46	3
	More than 50 students	59	138.06	3
	Total	255		2
Chi-Square= 12.545, df =3, p-value= 0.006<0.05				

The results obtained from the Kruskal-Wallis test (see Table 4.62) show statistically significant differences in students' learning autonomy existed among the participants from different class sizes (Chi-Square=12.823, df =3, p-value=0.005<0.05).The mean ranks suggest that the group from the class size of 31-40 students (mean rank=140.53) was more likely to have a high level of learning autonomy, while the group from the class size with more than 50 students (mean rank =99.62) was least likely. To determine which groups were statistically significantly different from one another, follow-up Mann-Whitney U tests were performed between all the groups. Differences were found between the following groups:

• 21-30 students and More than 50 students (U=880.500, Z=-2.210, Cohen's d=0.430, p-value =0.027<0.05)

• 31-40 students and More than 50 students (U=1778.500, Z=-3.332, Cohen's d=0.560, p-value =0.001<0.05)

• 41-50 students and More than 50 students (U=1448.500, Z=-2.771, Cohen's d=0.481, p-value =0.006<0.05)

Table 4. 62. *Kruskal-Wallis test on Q55 by Class size*

	Class size	N	Mean Rank	Median
Q55. I/My students am/are autonomous in learning.	21-30 students	40	129.65	3
	31-40 students	88	140.53	3
	41-50 students	68	135.44	3
	More than 50 students	59	99.62	2
	Total	255		3
Chi-Square=12.823, df =3, p-value = 0.005<0.05				

The results of Kruskal-Wallis tests performed on the 11 components by class size show that there were statistically significant differences between students in different class sizes regarding their views towards the current situation of related online support (p-value =0.000<0.05), online assessment and feedback (p-value =0.000<0.05) and online materials (p-value =0.032<0.05). The results are shown in Table 4.63, Table 4.64 and Table 4.65.

Table 4.63 indicates that level of agreement on Component 1 increased correspondingly with an increasing class size. Mann-Whitney U tests performed on Component 1 by class size show that significant differences were found within the following groups:

• "21-30 students" and "31-40 students" (U=1243.000, Z=-2.658, Cohen's d=-0.389, p-value=0.008<0.05)

• "21-30 students" and "41-50 students" (U=918.500, Z=-2.809, Cohen's d=-0.593, p-value=0.005<0.05)

• "21-30 students" and "More than 50 students" (U=550.500, Z=-4.490, Cohen's d=-0.977, p-value=0.000<0.05)

• "31-40 students" and "More than 50 students" (U=1892.500, Z=-2.781, Cohen's d=-0.497, p-value=0.005<0.05)

• "41-50 students" and "More than 50 students" (U=1566.000, Z=-2.128, Cohen's d=-0.333, p-value=0.033<0.05)

Table 4. 63. *Kruskal-Wallis test on Component 1 by Class size*

	Class size	N	Mean Rank
Related_online_support_Part_B	21-30 students	40	88.30
	31-40 students	88	123.85
	41-50 students	68	130.65
	More than 50 students	59	158.05
	Total	255	
Chi-Square=21.756, df =3, p-value = 0.000<0.05			

Table 4.64 shows that the students from the small classes had a more negative view of the issues related to this factor than those from the large classes. Mann-Whitney U tests performed on Component 3 by class size found there were differences between the following groups:

• "21-30 students" and "41-50 students" (U=776.500, Z=-3.712, Cohen's d=-0.760, p-value=0.000<0.05)

• “21-30 students” and “More than 50 students” (U=700.500, Z=-3.419, Cohen's d=-0.723, p-value=0.001<0.05)

• “31-40 students” and “41-50 students” (U=2302.500, Z=-2.464, Cohen's d=-0.415, p-value=0.014<0.05)

• “31-40 students” and “More than 50 students” (U=2051.500, Z=-2.152, Cohen's d=-0.379, p-value=0.031<0.05)

Table 4. 64. *Kruskal-Wallis test on Component 3 by Class size*

	Class size	N	Mean Rank
Online_assessment_and_feedback_Part_B	21-30 students	40	92.73
	31-40 students	88	117.93
	41-50 students	68	147.28
	More than 50 students	59	144.71
	Total	255	
Chi-Square=18.465, df =3, p-value = 0.000<0.05			

Table 4.65 shows that the level of agreement on the issues related to the current status of online materials increased correspondingly with increasing class size. Mann-Whitney U tests performed on Component 4 by class size found differences between the following groups:

• “21-30 students” and “41-50 students” (U=1016.000, Z=-2.191, Cohen's d=-0.473, p-value=0.028<0.05)

• “21-30 students” and “More than 50 students” (U=849.500, Z=-2.359, Cohen's d=-0.548, p-value=0.018<0.05)

Table 4. 65. *Kruskal-Wallis test on Component 4 by Class size*

	Class size	N	Mean Rank
Online_materials_Part_B	21-30 students	40	105.15
	31-40 students	88	119.87
	41-50 students	68	139.26
	More than 50 students	59	142.64
	Total	255	
Chi-Square=8.830, df =3, p-value = 0.032<0.05			

4.8 Correlations among the items

Spearman's Rho test was adopted to examine the relationship between the groups since most collected data in this research are ordinal (Cunningham & Aldrich, 2011). According to Cohen (1988), the value of the correlation coefficient ranges from -1.00 to 1.00, with a weak relationship ranging from ± 0.1 to ± 0.29, a moderate relationship from ± 0.30 to ± 0.49 and a strong one from ± 0.5 to ± 1.0. The positive and negative signs are related to the direction of the relationship rather than the strength of it. The value 0 means no correlation existing among the variables.

Part B had five sections, which were designed to examine assessment and feedback, online learning materials, online interactions, technology, and support. In the first section, Q9 was the precondition of the other questions. It was anticipated that Q9 and other questions of this section should have some correlations. These correlations were examined by Spearman's Rho test. The results are shown in Table 4.66.

Table 4. 66. *Spearman's Rho test on Q9 and Q10, Q11, Q12, Q13*

			Q9	Q10	Q11	Q12	Q13
Spearman's rho	Q9	Correlation Coefficient	1.000	.414**	.370**	.328**	.184**
		Sig. (2-tailed)	.	.000	.000	.000	.003
		N	255	255	246	255	255

**. Correlation is significant at the 0.01 level (2-tailed).

The results indicate that Q9 (Online assessments are used in my Maritime English courses) had a positive and significant correlation (Sig. =.000) with all the other questions in this section. Three pairs had a moderate correlation and one pair had a weak correlation. More specifically, those who agreed on the use of online assessments were more likely to agree on the use of varied forms and multi-aspect of online assessments. Besides, those who reported the use of online assessments tended to report the provision of online feedback. It is worth noting that Q9 had the weakest correlation with the diverse types of feedback. It means that the use of online assessment was not strongly correlated with the diverse types of online feedback from the respondents' views.

For the online learning materials, Q14 (Some online learning materials are provided in my Maritime English courses) was the precondition of other questions. Table 4.68 shows the correlation of Q14 with the other questions.

Table 4. 67. *Spearman's Rho test on Q14 and Q15, Q16*

			Q14	Q15	Q16
Spearman's rho	Q14	Correlation Coefficient	1.000	.519**	.553**
		Sig. (2-tailed)	.	.000	.000
		N	255	249	255

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.67 shows that Q14 had a positive and significant correlation with Q15 and Q16. The correlation coefficients of these two pairs were 0.519 and 0.553 respectively, suggesting a strong correlation between Q14 and Q15 and between Q14 and Q16. In other words, those students who used some online learning materials in their Maritime English study were more likely to report the provision of appropriateness and varied forms of online learning materials.

For online tool and support, Q23 (My institution provides online tools for online education) was the precondition of Q24 (The online tools provided by my institution perform stably in the process of my Maritime English education), Q25 (I/My students am/are allowed to use some online tools provided by my institution to study Maritime English), and Q26 (Online tools used in my Maritime English courses enhance my/my students' motivation in learning). Spearman's Rho test results regarding the online tool and support are shown in Table 4.69.

Table 4. 68. *Spearman's Rho test on Q23 and Q24, Q25, Q26*

			Q23	Q24	Q25	Q26
Spearman's rho	Q23	Correlation Coefficient	1.000	.526**	.438**	.291**
		Sig. (2-tailed)	.	.000	.000	.000
		N	255	250	253	250

**. Correlation is significant at the 0.01 level (2-tailed).

It can be seen from Table 4.68 that Q23 was correlated positively and significantly with Q24, Q25, and Q26. The values of correlation coefficients ranged from 0.526 to 0.291, embodying varied strength of the correlation. It shows that there is a strong and positive correlation between Q23 and Q24 and a weak and positive correction between Q23 and Q26.

4.9 Summary

This chapter has presented the detailed process and results of the quantitative data analysis related to this research. Both descriptive and inferential analyses have been conducted in this study. Median, frequencies, and percentages have been used to report the general information of the participants. EFA has been used to explore the underlying structure of observed variables. The internal reliability of the measuring instrument has been verified through Cronbach's Alpha. In addition, the interrelationships between variables and constructs have been obtained by using SEM. The result of SEM test has shown that the structure of the instrument is satisfactory with strong relations between various variables. Kruskal-Wallis tests and Mann-Whitney U tests have been performed to examine significant differences within and between groups. Spearman's Rho tests have been used to examine the correlated question items.

The next chapter discusses the qualitative data analysis. The data in Chapter 5 are mainly in textual form, which are obtained from the interviews. The analysis is underpinned by thematic analysis and three-step coding. The following chapter provides a different type of insight and identifies the emerging themes based on the conversations with the participants.

Chapter 5 Qualitative Data Analysis

5.1 Introduction

Following the previous chapter which presented the analysis results of the quantitative data of this research, this chapter focuses on the analysis of the qualitative data which are mainly based on the participants' responses in the interviews. Thematic analysis is adopted for this research. Thematic analysis is a theme development strategy using a mix of coding methods (Fereday & Muir-Cochrane, 2006). In order to make sense of the massive qualitative data, three-step coding (open coding, axial coding and selective coding) is applied in the analysis process. A descriptive discussion of the codes, categories and themes that emerged from the coding process is presented in this Chapter. NVivo (Version 11) is adopted for the qualitative data analysis of this research because this software can efficiently process large amounts of qualitative data (Jones, 2007).

5.2 Findings of qualitative data analysis

5.2.1 Participants

The participants in the semi-structured interviews included 12 maritime students and 12 Maritime English teachers in Chinese higher MET institutions. To address the research objectives, two sets of interview questions were designed for maritime students and Maritime English teachers. Using stratified random sampling, the participants were randomly selected from their subgroups which were divided according to the different geographical locations and educational tiers of the MET institutions in China. The semi-structured interviews included four pre-determined questions and further expanded questions if necessary. The number and background information of the interview participants are summarised in Table 5.1.

Table 5. 1. *The frequency distribution of the participants in terms of level and location of MET institutions*

Participants	Level			Location		
	A vocational certificate	An associate degree	A Bachelor's degree	North	Middle	South
Students	2	6	4	3	6	3
Teachers	1	6	5	4	5	3

From Table 5.1, it can be seen that most of the interviewees were taking either an associate degree or a bachelor's degree. This is in accordance with the fact that the majority of Chinese maritime students (around 89.96%) were studying for an associate degree or a bachelor's degree (MOT, 2018). Therefore, the frequency distribution of the participants' educational level was generally reasonable. Regarding the frequency distribution of the geographic locations of MET institutions, more participants were from the MET institutions located in the middle region while the number of those from northern and southern MET institutions was generally smaller. This is because Yangtze River, which is China's largest and busiest waterway (Zhang, Yan, Yang, Wall, & Wang, 2013), is located in the middle part of China and many MET institutions are founded along it to meet the needs of the shipping industry. Hence, the location distribution of MET institutions was acceptable for the current research.

5.2.2 Coding process

Coding is a process of understanding and abstracting raw data in order to develop a construct (theme or category) and theory (Fereday & Muir-Cochrane, 2006). In most cases, a qualitative code can be a word or a phrase that summarises, highlights or captures the essence of a portion of data (Saldaña, 2015). The coding process of this study involved the breaking down, comparison and categorisation of data (Punch, 2013). Three coding stages were applied in the qualitative coding process. NVivo (Version 11), which was specifically designed for analysing qualitative data and was popularly used by researchers, was adopted for the purpose of the qualitative data analysis (Edhlund & McDougall, 2017).

The first coding stage was open coding, which enabled the researcher to identify the keywords of the research topic and then develop them into substantive codes (Bryman, 2015). At this stage, as suggested by Neuman (2012), the researcher carefully went through the raw data line-by-line, identified and compared conceptual units emerged from the data, and placed relevant units in the same coding group. As a result, 44 open codes were generated from open coding.

The second operation of the qualitative data analysis was axial coding, which interconnects the open codes with each other (Punch, 2013). During this process, the researcher interconnected the open codes by examining the patterns emerged from them. A pattern is the repetitive or consistent occurrences of data grouped by the features of similarity, difference, frequency, sequence or causation (Saldaña, 2015). Some existing categories from the

questionnaires of this research, such as online assessment and feedback online learning materials, online interactions, and related online support, were considered and adopted when establishing the categories for the interview data analysis. Besides the existing categories from the questionnaires, emerging categories were also established, such as the functions of multimedia classrooms, Maritime English learning applications (Apps), online platforms and internal and external factors for not adopting online education. The open codes obtained from the first stage were reclassified into 17 categories.

The third coding process is selective coding within which categories obtained from the second stage were further integrated and refined into core generalisations and ideas (Bryman, 2015). The core generalisations and ideas were labelled as themes in this study. After this process, the categories that had emerged from the second stage were grouped into five themes. Specifically, these themes were labelled as the current status of online Maritime English education, needs for online Maritime English education, readiness for online Maritime English education, recommendations for online Maritime English education and barriers to implementing online Maritime English education in China.

5.3 Results

With these coding strategies, Table 5.2 shows the distribution of references, codes, categories, and themes. From the table, it can be seen that 44 codes, 17 categories and 5 themes emerged from the interview data.

Table 5. 2. *The distribution of references, codes, categories, and themes*

Themes	Categories	Codes	Sources	References
Current status of online Maritime English education	Functions of multimedia classrooms	4	8	9
	Maritime English learning applications (Apps)	2	4	4
	Online assessment and feedback	2	6	7
	Online interactions	2	2	2
	Online learning materials	2	6	6
	Online platforms	3	4	4
Needs for online Maritime English education	Online assessment and feedback	1	1	1
	Online interactions	1	6	6
	Online learning materials	2	6	7
	Online platforms	2	5	6
	Related online support	3	3	3
Readiness for online Maritime English education	Self-efficacy and self-management of online learning	2	2	2
	Related online support	6	13	14
Recommendations for online Maritime English education	Learning modes	3	20	20
	Others	1	10	10
Barriers to implementing online Maritime English education in China	Internal factors	6	8	11
	External factors	2	2	2

5.3.1 Current status of online Maritime English education in China

Table 5.3 shows the six categories in terms of the number of references and sources. The number of sources or references could generally indicate the importance of each category.

Table 5. 3.*The distribution of categories under the theme of the current status of online Maritime English education*

Current status of online Maritime English education		Sources	References
Categories	**Codes**		
Functions of multimedia classrooms	Computers are used without internet access	4	4
	Not using the available internet in class	2	2
	Using the internet to present online learning resources sometimes	2	2
	Teachers control the computers	1	1
Online assessment and feedback	Complete some exercises online and receive feedback from software	4	4
	Complete some exercises online and receive feedback from teachers	2	3
Online learning materials	Except for exam question banks, it is difficult to find other Maritime English resources online	3	3
	Students learn Maritime English with some online resources related to exams	3	3
Maritime English learning applications (Apps)	Apps are not fully explored for Maritime English online learning	3	3
	Using some micro-learning resources in class	1	1
Online platforms	Not being used for Maritime English teaching	2	2
	Containing inaccessible links	1	1
	A lack of online platforms	1	1
Online interactions	Limited online interactions	1	1
	Human-computer interactions	1	1

5.3.1.1 Functions of multimedia classrooms

The category of “Functions of multimedia classrooms” was regarded as the most important factor since it had the biggest number of sources (n=8) and references (n=9). There were four codes under this category. The most frequent code is “Computers are used without internet access”. As one student stated:

> In Maritime English multimedia classroom, the computer is mainly used by the teacher to play audio recordings of textbooks or sometimes present PPT (PowerPoint slides).
>
> Student #1

Furthermore, some teachers found it unnecessary to use the internet in class. As is clear in the following statement from a Maritime English teacher interviewed:

> We have computers that can be connected to the internet in the classroom, but I normally do not use the internet in my Maritime English classes because I have prepared all the materials needed for Maritime English classes beforehand. The computers in the class are normally used for presenting PPT, audio and video recordings. But I will encourage my students to find some relevant online learning materials after class because it can extend their knowledge.
>
> Teacher #2

However, two Maritime English teacher interviewees stated that they sometimes used video clips in Chinese to help students understand some perplexing content about maritime knowledge. From the feedback from both students and the teachers, it seems that Maritime English classrooms are still dominated by the traditional teacher-centred teaching mode. In addition, the use of computers and the internet was depicted as mostly controlled by the teacher in class. As one student complained:

> …But at present, even in the multimedia classroom, only the teacher can access the computer with the internet, so it is very hard to have online activities in class.
>
> Student #2

5.3.1.2 Online assessment and feedback

For the category of "Online assessment and feedback", two codes emerged: 1) Completing some exercises online and receiving feedback from software; and 2) Completing some exercises online and receiving feedback from teachers. Three students and three teachers interviewed stated that some exercises were completed online and the corresponding feedback was received online. Four out of these six interviewees stated that the online feedback was automatically generated by the teaching and learning software. Take, for example, this comment from a Maritime English teacher describing online feedback provided by software:

> …But I require my students to complete some Maritime English excises through WeChat (Chinese social media mobile application) after class. The exercises are all multiple choices. Once they submit their answers, the results

> will be immediately shown to them and sent to my account. It is convenient to have first-hand information through such application software.
>
> Teacher #5

Since Maritime English exams for a seafarer's certificate of competency were in the form of all multiple-choice items, as one Maritime English teacher reported (#7), the content of online assessment tends to be chosen from the exam question bank which is composed of multiple-choice questions. It is very convenient for students to know the answers to the multiple choice questions almost immediately after submitting their answers.

However, two interviewees (one student and one teacher) stated that teachers also provided feedback online for some online exercises or quizzes. This feedback is different from the simple answers to multiple-choice questions. Below are two examples to illustrate this point:

> We have a kind of online teaching and learning software. We use it to practice Maritime English listening and speaking skills with both teachers and students. We can record our speaking and then evaluate it by replaying. ... This software can also be used to submit our assignments and do quiz in class. We can get the teachers' feedback with this software.
>
> Student #7

> In addition to traditional teaching, we established a website to teach Maritime English writing. It provides tips and resources for Maritime English writing. Students can submit and get the online feedback of their writings. It is proved to be a useful tool for teaching writing skills.
>
> Teacher #10

5.3.1.3 Online learning materials

For the category of "Online learning materials", there were two codes: 1) Except exam question banks, it is difficult to find other Maritime English resources online; and 2) Students learn Maritime English with some online resources related to exams after class. Although there are various Maritime English online learning and testing resources overseas developed by foreign corporations, such as Cambridge University Press' Safe sailing: SMCP training for seafarers (Murrell et al., 2009), MarEng (2004-2007) and MarEng PLUS (2008-2010) (Ziarati et al., 2013), TOMEC (Takagi et al., 2004) and IMETS (IMETS, 2018), it is difficult

to access online Maritime English learning materials since the search engine "Google" is not accessible in China. The major search engines available in China are better at processing Chinese information (Ursell, 2017). As a result, many interviewees raised their concerns about the lack of access to resources relevant to Maritime English. This is evidenced by the following statements from the interviewees:

> I think in my college, the online environment is good. But we find it is difficult to systematically teach Maritime English online due to the lack of resources and Maritime English education websites.
>
> Teacher #12

> Except for the exam question bank and some limited online resources, we do not have other online forms of Maritime English learning.
>
> Student #9

> Sometimes I try to find Maritime English resources online but with few results.
>
> Student #1

At present, both teachers and students reported that it was difficult to find useful online Maritime English materials through the primary search engines used in China, such as Baidu and Sogou. Consequently, except multiple-choice questions for Maritime English exams, the findings seemed to suggest limited online resources used in China.

5.3.1.4 Maritime English learning applications (Apps)

For the category of Maritime English learning applications (Apps), there were four codes: 1) Apps are not fully explored for Maritime English online learning; 2) Apps are used as a supplement after class; 3) Practicing listening skills; and 4) learning vocabulary.

Currently, mobile Apps influence almost every walk of life (Petsas, Papadogiannakis, Polychronakis, Markatos, & Karagiannis, 2013). Various online mobile devices, such as smartphones and tablets, influence the development of education for millennials who have grown up with them (Lenhart, Purcell, Smith, & Zickuhr, 2010). These online mobile devices used for learning with educational Apps are greatly demanded by learners who are willing to learn at their own pace (Zhang & Liao, 2015). However, mobile Apps were described by the interviewees as not fully explored for the purpose of Maritime English teaching and learning.

As one Maritime English teacher (#5) stated, “We have not made full advantage of some powerful and popular Apps like WeChat, Netease Cloud Class, and Weibo.” At present, as another teacher stated in this research, Maritime English Apps in most cases were used as a supplement after class. One student (#3) interviewed in this research explained his experience: “I downloaded some Apps to learn Maritime English. They are useful in remembering the Maritime English words and practicing listening skills”. These powerful Apps could be further adopted for Maritime English education.

Micro-learning is a holistic approach to deal with short and focused chunks of learning and it brings learners autonomy in learning by providing a seamless connection between life and work (Callisen, 2016). However, only one interviewed teacher (n=1) designed and used some micro-learning resources in class, such as bite-sized, attention-grabbing lessons. Making a short, focused micro-learning video is time-consuming and requires video editing abilities (Eades, 2014). For the micro-learning, a teacher interviewed expressed a similar concern:

> Making micro-learning materials needs a lot of extra time and effort from the teacher. And it is not part of the evaluation of the teachers’ performance. For that reason, some teachers probably would not put their efforts into making such materials. I think there should be some incentives for Maritime English teachers to carry out online teaching.
>
> Teacher #8

5.3.1.5 Online platforms

For the category of “Online platforms”, there were three codes: 1) Not being used for Maritime English teaching; 2) Containing inaccessible links; and 3) A lack of online platforms. Two interviewees (n=2) mentioned that the existing platforms in their colleges were not used for Maritime English teaching. As one teacher stated:

> We have a platform for Maritime English teaching and learning. Sometimes I would upload some information and resources in this platform, but few students go online to read or study them. Normally, we do not use the platform for classroom teaching.
>
> Teacher #4

It is indicative that the available platform was not used properly or effectively. It required more effort to motivate students to use it. There is still a lot of work to do for carrying out Maritime English teaching and learning on an online platform.

5.3.1.6 Online interactions

For the category of "Online interactions", there were two codes: 1) Limited online interactions; and 2) Human-computer interaction. Two of the interviewees (n=2) shared their experience related to online interactions in their Maritime English teaching or learning. One student stated that online interactions rarely occurred in class since the teacher dominated and controlled the whole teaching and learning process (#12). Another student stated his experience in online interactions:

> We have a kind of online teaching and learning software. We use it to practice Maritime English listening and speaking skills. We can record our speaking and then evaluate it by replaying them. This practice can help improve our speaking skills.
>
> Student #7

The interactions mentioned mainly occurred between human and device which are different from teacher-student and student-student interactions in this educational context. His experience also indicated a possible lack of online interactions among students and teachers.

5.3.2 Needs for online Maritime English education in China

Based on the number of sources and references in each category contained in the theme "The needs for online Maritime English education", the most important category was "Online learning materials" followed by the categories of "Online interactions", "Online platforms", "Technical support and training", and "Online assessment and feedback" (see Table 5.4).

Table 5. 4. *The distribution of categories under the theme of needs for online Maritime English education*

Needs for online Maritime English education		Sources	References
Categories	**Codes**		
Online learning materials	Real-life learning materials	4	4
	Getting access to online Maritime English materials	3	3
Online interactions	More online interactions needed	6	6
Online platforms	A powerful online Maritime learning platform	4	4
	A platform that can be accessed by private online devices	2	2
Related online support	Free internet access on campus	1	1
	Online facilities need to be updated on campus	1	1
	Technical training in using online technology	1	1
Online assessment and feedback	Online assessment and feedback for practical Maritime English proficiency	1	1

5.3.2.1 Needs for online learning materials

There were two codes in the category of "Online learning materials": 1) Real-life learning materials; and 2) Getting access to online Maritime English materials. Generally, the demand for online real-life materials from both the interviewed teachers and students was strong. Take, for example, two comments describing the needs for accessing online learning materials by one student and one teacher:

> I need online resources that can show me how to practice in real English speaking environment on board. I cannot find Maritime English learning materials online. Even there are some, but they are not free of charge. I need instructions on how and where to find useful Maritime English learning materials.
>
> Student #3

> From my personal perspective, I need more online Maritime English micro-learning resources. In preparing micro-learning class, I realise that the online Maritime English resources are in extreme scarcity. I can hardly find any from the major educational websites for micro-learning resources.
>
> Teacher #12

Some interviewed students expected their teachers to upload learning materials online for self-learning. As one student (#6) stated, “I want the teacher to put the course information, materials, exercises and references online so that we can study English more efficient after class”.

For the content of online learning materials, the interviewees preferred to some real-life materials that can motivate students in learning and familiarise themselves with the real working environment on board. This is evident in the following statements from the interviewees in this research:

> We need some videos on daily communication of the seafarers throughout the world so that we could get familiar with the various slangs and accents speaking on board. We also need more online Maritime English listening resources. The presently used Maritime English listening materials are mainly related to the exercises of our teaching materials. They are not interesting enough. Some students would nap on listening to such exercises.
>
> Student #1

> The content taught in the Maritime English classes should be useful in practice. The present textbook is mainly formed by text, words, and exercises. Even if I studied the textbook thoroughly, I still have no idea about real communications in the working environment. It is proper to make us be familiar with the real working environment with the aid of the internet.
>
> Student #6

> In addition, we also need more online Maritime English resources to intrigue students’ learning interests. You know, the available online resources related to Maritime English education are limited. If the college can buy some online resources, it would be much easier for us to find and use relevant materials.
>
> Teacher #3

> We need online resources that can meet the current demands of the seafarers. The current teaching materials have been used for more than one decade. They only comprise textbooks, listening materials and exercises with few relevant online learning materials. They need to be updated in forms and contents.
>
> Teacher #11

The above sharing seemed to suggest that the current Maritime English teaching materials seemed not to meet the needs of maritime students and Maritime English teachers in terms of form and content. They expected that these problems could be addressed or resolved by adopting online learning materials.

5.3.2.2 Needs for online interactions

Regarding the needs for online interactions, there was only one code in this category: “More online interactions needed”. Since “effective communication” is the requirement stipulated in STCW Manila Amendments and such ability cannot be improved without interactions, online methods were expected to be applied to increase the frequency and quality of interactions for Maritime English study. It is evidenced by the following statements from both students and teachers interviewed in this research:

> It is necessary to use online methods to practice communication. Some students are too shy to speak openly. With the help of the internet, I think they can overcome this obstacle.
>
> Student #2

> In Maritime English classes, the teacher explains the subject himself from the beginning to the end of the class. There is no time for interaction and questions. We need more interaction with Maritime English teachers and students in Maritime English study. A class dominated by teachers’ explaining is boring. I especially hope to have more interactions with the aid of the internet.
>
> Student #5

> I think the internet can provide many new ways of interactions and students can express themselves more freely and openly with the aid of the internet.
>
> Teacher #1

> My students are weak in listening and speaking. Maybe the internet can provide new ways for students to improve their listening and speaking skills.
>
> Teacher #7

Different from traditional face-to-face communication in the classroom, online interactions in both synchronous and asynchronous forms can occur without time and space constraints.

Online interactions were felt by the interviewees to be able to meet the demand of maritime students who had limited interactions in a traditional face-to-face classroom. Online interactions can be free of communication stress for Chinese maritime students who are shy to speak English in a traditional face-to-face classroom.

5.3.2.3 Needs for online platforms

There were two codes in the category of "Online platforms": 1) A powerful online Maritime learning platform; and 2) A platform that can be accessed by private online devices. As one teacher (#11) suggested in the interview, an online platform should facilitate the practice of all Maritime English skills including listening, speaking, reading and writing, especially the first two types of skills. There was also an expressed desire for a platform that is powerful enough to support Maritime English learning. As a teacher stated in the interview:

> In addition, a learning platform is needed for online Maritime English study. Online teaching platform is very important in practical English education. Without the platform, it is hard to manage online Maritime English teaching and learning systematically. I know some foreign colleges use Learning Management System to implement online education. Such a system includes all the services and resources needed for online Maritime English education. I think we should increase investment in this area.
>
> Teacher #6

Another need regarding online platforms was that they could be accessed by users' private devices, such as smartphones and tablets. As stated by one teacher (#5), "smartphones are prevailing among students. It is important to develop a platform or App for students to learn Maritime English anywhere and anytime. Currently, there are few such products".

5.3.2.4 Needs for related online support

There were three codes in the category of "Online platforms": 1) Free internet access on campus; 2) Online facilities need to be updated on campus; and 3) Technical training in using online technology. As mentioned in Section 5.3.1.1, not all classrooms are connected to the internet due to teachers' preference and internet availability. For the purpose of online education, it was felt by the interviewees that there must be sufficient internet coverage on campus to make the participants connected. As one teacher (#1) suggested in the interview:

"…but first of all, we need to be connected with the internet in the Maritime English classes". Besides the internet coverage on campus, other online facilities were mentioned as necessary for the purpose of online language education. In some MET institutions, more investment in this area is needed. This need is demonstrated, for example, in the following comment from one teacher:

> In my college, online facilities need to be updated. Some computers have been used for almost a decade. Some facilities are not properly maintained. For example, some earphones and mouses are missed or damaged. …students are not convenient to use public computers for learning on campus.
>
> Teacher #8

The above interview data indicate that investment by MET institutions is needed in updating and maintaining online facilities to ensure the implementation of online education. Also, investment needs to be made in training teaching staff and students for the purpose of online Maritime English education. As it is evidenced by a statement from a teacher (#8), "Many teachers are weak in applying online technologies. They need to be trained to use the new teaching mode".

5.3.2.5 Needs for online assessment and feedback

Unlike the previous four categories in this section, this category contained only one code: "Online assessment and feedback for practical Maritime English proficiency". Accordingly, a general agreement among the interviewees was that online assessment and feedback need to be diversified and focus on real-life English proficiency. Take, for example, a description of such demand by one teacher interviewed in this research:

> I feel we need a great deal of improvement in Maritime English education because the assessment mode has been used for many years and is mainly formed by multiple choice questions. In such an assessment mode, students are only tested for their familiarities with the exam questions. It cannot evaluate real Maritime English proficiency. Some of students' abilities have not been fully tested, such as speaking and writing skills. Online methods may provide alternatives or supplements for the traditional assessment, thus making the assessment more reliable.
>
> Teacher #1

5.3.3 Readiness for online Maritime English education in China

Under the theme of "Readiness for online Maritime English education", Table 5.5 shows that two categories emerged: 1) Related online support; and 2) Self-efficacy and self-management.

Table 5. 5. *The distribution of categories under the theme of readiness for online Maritime English education*

Readiness for online Maritime English education		**Sources**	**References**
Categories	**Codes**		
Related online support	Inconvenient to use online facilities on campus	3	4
	Online facilities are available and ready for use	3	3
	Students and staff are not trained for the purpose of online education	2	2
	Lack of a management system for online education	2	2
	Lack of Maritime English platform, software, and related resources	2	2
	Personal mobile online devices are available	1	1
Self-efficacy and self-management of online learning	Lack of self-efficacy and self-discipline in learning	2	2

5.3.3.1 Related online support

Based on the codifying frequency of codes in the former category, the first three important codes were: 1) Inconvenient to use online facilities on campus; 2) Online facilities are available for use; and 3) Students and staff are not trained for the purpose of online education, which further strengthened the findings about the needs for related online support in Section 5.3.2.4. Four of the interviewees reported that it was not convenient to use online facilities on campus while five of them believed that some kind of online facilities were available. Two students suggested that free WiFi (Wireless Fidelity) on campus should be provided. Both teachers and students (n=4) admitted a lack of relevant knowledge and skills for online Maritime English education.

Furthermore, three teachers stated that there was a lack of management for online education, which should involve both external collaboration and internal operation. Take, for example, the following two statements from two teachers in the interviews:

> Successful online Maritime English education needs support from various departments. At present, we lack such collaboration and services. For example,

> timely support is important to perform online education smoothly. But in reality, if the computers in the classroom are out of order, it normally takes three days to one week to fix (the problems). For some big problems, it takes even longer. We have no substitutions. For that reason, some teachers avoid using some facilities during the class.
>
> Teacher #4

> Computers or laptops are also common among students. We are easily connected through the internet. These are the preconditions for online Maritime English education. I think we are ready. But we lack appropriate Maritime English software, online resources, and management system. For example, a systematic management system is necessary for low self-efficacy or self-disciplined students to carry out online activities.
>
> Teacher #9

The interview data seems to highlight a lack of proper Maritime English teaching and learning software and related materials, although personal mobile devices were available to almost every university student nowadays. Despite the fact that there existed public online learning platforms, as one student (#10) stated, “there was a lack of specific platforms for online Maritime English education”.

5.3.3.2 Self-efficacy and self-management of online Maritime English learning

As mentioned in the literature review of this thesis, self-efficacy is defined by psychologist Bandura (1993) as one’s confidence in achieving a goal or completing a task. Two teachers interviewed were concerned about the low self-efficacy and weak self-discipline of their students in English language learning. As one teacher stated in the interview,

> I do not think we are ready for online learning due to their (students’) low level of Maritime English proficiency. The lower their English proficiency, the less confident they feel in communicating in English. Furthermore, they greatly lack self-discipline in English learning. ...I think online Maritime English education may be more feasible for those students who have higher Maritime English levels and strong self-discipline.
>
> Teacher #2

5.3.4 Recommendations for online Maritime English education in China

Under the theme of "The recommendations for online Maritime English education", Table 5.6 shows that four categories emerged: 1) Blended learning; 2) Adjunct mode; 3) Fully online learning; and 4) Others. The first three categories in this theme are based on the three main modes of online delivery. Within the three categories, the most frequently mentioned category was "blended learning" which account for 50% (n=12), followed by adjunct mode (29%, n=7) and fully online learning (4%, n=1).

Table 5. 6. *The distribution of categories under the theme of recommendations for online Maritime English education*

Recommendations for online Maritime English education		**Sources**	**References**
Categories	**Codes**		
Learning modes	Blended learning	12	12
	Adjunct mode	7	7
	Fully online learning	1	1
Others	Considering individual needs	4	4
	Providing free WiFi access and computer use on campus	2	2
	Changing the tricky Exam-oriented education to communication proficiency-focused one via online methods	2	2
	Designing more interactive activities	1	1
	Increasing productivity and collaboration	1	1

Regarding suggestions for blended learning in this research, four students expected to see the introduction of interesting learning software, practical English learning materials and more online interactions. Five teachers expected online activities to be designed to increase students' engagement and motivation in English language learning.

> This software should be designed to be more interesting. English learning game software could be integrated into it so that we could learn Maritime English through game playing.
>
> Student #7

> I think it is necessary to use online methods to improve Maritime English teaching quality. Some aspects of teaching are hard to be improved by traditional methods. For example, most students in my class are very timid and inward. I tried a lot of ways to interact with them, but with little effect. I think

> the internet can provide many new ways of interactions and students can express themselves more freely and openly with the aid of the internet.
>
> Teacher #1

> We can try to create some micro-learning resources and circulate them among students through the internet. Teaching videos on actual operation can be explained and dubbed in English other than Chinese so as to strengthen students' Maritime English ability.
>
> Teacher #3

> It is necessary to integrate online methods into Maritime English learning because students are inclined to be bored in the traditional mode. Online methods can motivate students' interest in Maritime English to some extent.
>
> Teacher #8

However, seven interviewees considered online methods as playing an adjunct role in Maritime English education. Some believed that English learning was determined by students' own commitment rather than the learning supporting technology. Others were worried that online methods could be a potential distraction for students in the learning process. Below are two examples from the interviewees to illustrate this point:

> I feel that online teaching can assist in Maritime English teaching. But without it, we can also learn Maritime English well if we study hard enough.
>
> Student #5

> Online methods, in my opinion, can be only regarded as an assistant for teaching. We can use the internet to find useful Maritime English materials. But in current situation, I think it is impractical to teach through the internet because it can greatly distract students.
>
> Teacher #2

There was also one teacher who stated that fully online education could be a preferred learning mode in the future. She suggested that online Maritime English education, if possible, should be widely carried out under an established management system in her college. Some other suggestions did not fit well with the abovementioned three categories. These suggestions were therefore categorised as others. These suggestions were mainly

related to two aspects: pedagogy (1, 2, 4, &5) and resources (3). The explanations for the other suggestions are shown in Table 5.7.

Table 5. 7. *The explanations for the other suggestions*

Other suggestions	Explanations
1. Considering individual needs	Online learning needed to be differential to cater for different English level learners. (Student #10)
2. Designing more interactive activities	In Maritime English classes, the teacher explains the subject himself from the beginning to the end of the class. There is no time for interaction and questions. We need more interaction with Maritime English teachers and students in Maritime English study. (Student #11)
3. Providing free WiFi access and computer use on campus	To carry out online Maritime English education, I think it is necessary to provide free WiFi and updated computers on campus. Currently, these conditions are not mature. (Student #6) To practice online Maritime English education, we should have a stable free WiFi for students and teachers because online teaching and learning would consume a large volume of network flow which is expensive for students if they are required to pay for it. (Teacher #9)
4. Changing the tricky Exam-oriented education to communication proficiency-focused one via online methods	The teaching and learning emphasis of Maritime English should be shifted from just getting a certificate to real communication skills. (Student #7) To lay a solid Maritime English foundation for students, we need to shift our focus from just helping students get a certificate to improving practical English. (Student #10)
5. Increasing productivity and collaboration	Performing online Maritime English education is a large project which needs support from many departments. Online education requires higher work efficiency and closer collaboration. We still need to learn how to make our work meet such requirements. (Teacher #4)

5.3.5 Barriers to implementing online Maritime English education in China

Some interviewees in this research showed their concerns about the existing barriers and challenges regarding online Maritime English education. These concerns were grouped into the following eight groups: 1) Traditional mode is preferred by students; 2) Distraction by irrelevant online activities in class; 3) The belief in individual effort regardless of teaching modes; 4) Limited Maritime English class time; 5) Limited number of students in some classes; 6) Lack of interest in online education; 7) Students' low English proficiency and lack of independent learning ability; and 8) Unfamiliarity with online education, which is shown in Table 5.8.

Table 5. 8. *The distribution of categories and codes under the theme of barriers to implementing online Maritime English education in China"*

Barriers to implementing online Maritime English education in China		**Sources**	**References**
Categories	**Codes**		
Internal factors for not adopting online education	Traditional mode is preferred by students	3	3
	Distraction by irrelevant online activities in class	2	3
	The belief in individual effort regardless of teaching modes	2	2
	Lack of interest in online education	1	1
	Students' low English proficiency and lack of independent learning ability	1	1
	Unfamiliarity with online education	1	1
External factors for not adopting online education	Limited Maritime English class time	1	1
	Limited number of students in some classes	1	1

The first three codes of the category of the internal factors were more frequently coded compared to the rest of them. The biggest reason showed that the traditional mode was preferred by students to pass Maritime English exams. It indicated that passing Maritime English exams was the priority of both teachers and students. The explanations for the barriers to implementing online Maritime English education in China are shown in Table 5.9.

Table 5. 9. *The explanations for the barriers to implementing online Maritime English education in China*

Barriers	Explanations
1. Traditional mode is preferred by students	I think our most important aim is to get the Certificate of Competency. For this aim, I do not think online teaching is necessary because lots of previous students got the Certificate just through doing exercises. (Student #5) Online technologies have not been applied to my Maritime English teaching. The most important aim of Maritime English teaching is to help students pass Maritime English exam for the Certificate of Competency. (Teacher #2)
2. Distraction by irrelevant online activities in class	I believe learning online will have serious side-effects on them. For example, they are easily be attracted by other online activities such as chatting and games, and the teachers will have more difficulties in controlling the class in such teaching mode. (Teacher #2) Our Maritime English classroom is equipped with a computer with an internet connection, but students are forbidden to go online during class time in case they would not listen to the teacher attentively. (Teacher #4)
3. Belief in individual effort regardless of teaching modes	I feel that online teaching can assist in Maritime English teaching. But without it, we can also learn Maritime English well if we study hard enough. (Student #5) I do not think online learning is necessary for Maritime English study because some students can also learn very well in the traditional mode. The effect of study largely depends on individual effort. (Teacher #2)
4. Limited Maritime English class time	In my college, online ME teaching has not been carried out yet because the time allocated for ME class is so limited that we can only focus on the textbook. (Teacher #3)
5. Limited number of students in some classes	My ME class is relatively small, which only has 18 students. So I do not think it is necessary to use online teaching. (Student #4)
6. Lack of interest in online education	I do not care about online ME teaching. (Teacher #6)
7. Students' low English proficiency and lack of independent learning ability	It seems unnecessary to carry out online Maritime English teaching due to the relatively low ME level and independent learning ability of the present students. (Teacher #6)
8. Unfamiliarity with online education	I think it would be better if we can practice and be trained for this online software before Maritime English class. In the class, many students could not finish their tasks just due to their unfamiliarity with this software. And also because of this reason, many functions are not fully used in our ME study. (Student #7)

5.4 Summary

Chapter 5 has presented the process and results of the qualitative data analysis related to this research. This chapter has first discussed the background information of the participants and briefly described the analysis process. With the use of the data analysis software NVivo, the

interview data were coded, categorised and themed based on the relationship between these codes, their frequencies and the underlying meaning across the codes. There were 44 codes, 17 categories and 5 themes obtained from the qualitative data of the interview data. The results have revealed that online Maritime English education is far from being properly applied and developed in China, although there are notable needs for online learning. The results have also discovered some obstacles to implementing online Maritime English education in China which are worth being further explored in the next chapter.

The following chapter provides an analytic discussion on the results obtained from Chapter 4 and Chapter 5. The findings are presented in the order of research objectives. The results analysed from the data are compared with the theories and research evidence reviewed in the literature. Based on the discussions, recommendations for online Maritime English education in China are provided.

Chapter 6 Discussion and Recommendation

6.1 Introduction

The previous two chapters have detailed quantitative and qualitative data analysis process and results. This chapter synthesises the results that have emerged from the data analysis process and discusses them in relation to the literature to answer the research questions. Recommendations for online Maritime English education in China are included in the chapter. According to the research objectives and research questions, the findings are presented and discussed in the following four sections: 1) Current status of online Maritime English education; 2) Needs for online Maritime English education; 3) Readiness for online Maritime English education; and 4) Recommendations for online Maritime English education.

6.2 Current status of online Maritime English education

6.2.1 General status of online Maritime English education

In this research, the current status of online Maritime English education in China is investigated through analysing the perceptions obtained from Chinese maritime students and Maritime English teachers. It is revealed that current online Maritime English education in China is still in its early stages. Many aspects of online Maritime English education, such as online learning materials and online interactions, are just the repetition or compilation of classroom-based courses. Some online functions have not been fully exploited. For example, online learning platform is largely ignored in practical learning and teaching.

The data from this research shows that a vast majority of the Maritime English classes in China were dominated by the traditional teaching mode. This finding is consistent with the situation discussed in the literature that states current Maritime English education in China is still performed in an old-fashioned manner (Weng, 2015; Zhou, Xiao, Kang, Bai, & Yang, 2013). It indicates that limited online teaching and learning facilities are applied in the current system of Maritime English education. However, it is found that the application of online methods into the teaching and learning process, such as using online learning platform and online assessment, influenced the participants' views towards online learning. In this research, compared to the group mainly taught with a traditional teaching mode, the group utilising online methods had a more positive attitude towards all the factors related to the

current status of online Maritime English education in China. In this way, to make online learning more appreciated by students and teachers, much more effort should be put into overcoming obstacles to implementing online education.

According to the interviews from both teachers and students in this research, the reasons for not adopting online Maritime English education included: 1) Traditional mode is preferred by students; 2) Distraction by irrelevant online activities in class; 3) The belief in individual effort regardless of teaching modes; 4) Limited Maritime English class time; 5) Limited number of students in some classes; 6) Lack of interest in online education; 7) Students' low English proficiency and lack of independent learning ability; and 8) Unfamiliarity with online education. The explanations for these reasons were presented in Chapter 5. These reasons are largely in alignment with the finding of Zhu, Valcke, and Schellens (2010) who found that the main reasons perceived by Chinese faculty members for the non-adoption of online education include: no need for online learning since the current teaching mode works well; lack of institutional incentives and requirements for online education; lack of related technical skills and training; and scepticism regarding online interactions and communication due to online distraction.

The first reason “traditional mode is preferred by students”, is prominent according to the interviews in this research. This is not surprising given the strong exam-oriented education culture in China. In China, passing Maritime English exams is regarded by both Maritime English teachers and maritime students as the top priority in Maritime English education (You, 2012). Around 60% of Chinese students surveyed chose online learning tools for the purpose of preparing for exams (Li, 2016). The exam-oriented Maritime English education affects online Maritime English education to a great extent, which will be discussed in the following sections.

Although ICT has been applied in Maritime English education in varying degrees, generally the application is mainly limited to the adjunct mode which means ICT is used as an auxiliary tool to assist in traditional teaching rather than an inseparable component of the learning process. This finding is consistent with the survey results by Tham and Tham (2011) that indicates blended learning in Asian countries, including China, is only a form of support learning since a severe lack of consideration is provided to instructional design and strategies as well as the varied learning needs and learning styles of learners. In fact, technology enables learners to involve fully in personal or social improvement (Warschauer, 2002).

Technology can be used not only to deliver learning, but also to evaluate the contributions learners made to online learning experiences, such as self-management, expectation and beliefs, metacognitive knowledge, and strategy use (Hockly, 2015; White, 2006). Therefore, the application of technologies in Maritime English classes needs to be further explored. Research indicates that an appropriately-implemented online learning approach can significantly improve learning experiences in terms of increased student engagement, learning support, learning flexibility, learning autonomy and learning collaboration in a less stressful learning environment (Marsh, 2012).

6.2.2 Current status of online Maritime English materials

Online learning materials must be properly designed to ensure the effectiveness of online courses (Ally, 2008). Constructivism places emphasis on personal differences, thus online learning materials should address the needs of individual learners, such as learning styles and learning ability (Ally, 2008), which is largely neglected in Maritime English education in China. The data from the questionnaires of this research shows that although some online learning materials were provided in Maritime English courses, a small number of the participants agreed that the online learning materials provided to them were appropriate to their English level or various forms of Maritime English learning materials were provided via online methods. This implies that the presently used online Maritime English materials do not meet the individual needs of many maritime students. However, it is reported that the application of online materials was positively correlated with the degree of appropriateness and the various forms of the materials. In other words, those who reported the application of online learning materials in their Maritime English courses were more likely to find their online materials to be appropriate and adequately diversified. Therefore, applying more online materials into practical teaching and learning is a feasible way to improve the quality of the materials. Students will be more motivated in their learning when a range of relevant online materials are provided in different formats to them (Condie & Livingston, 2007).

The information obtained from the interviews of this research shows some specific problems in online materials. Although there were some Maritime English learning resources available online, most of them were reported to be used as self-study materials without proper guidance or requirement. In addition, according to the interviewees, few of these online resources had been systematically applied in Maritime English teaching and learning. The current online materials in use were mainly presented as an e-version of traditional textbooks and exam

question banks. This may explain the findings from the questionnaires that the online materials were not presented in various forms and the content of current Maritime English textbooks did not satisfactorily meet the practical needs of learners. The above features of the current online learning resources not only blurred the boundary between Maritime English and other professional courses, but also made the books boring, inauthentic and impractical (Wang, 2015). Exam question banks were compiled to assist maritime students to obtain competency certificates (Shen & Wang, 2011). However, the widely used question banks turned Maritime English education into urging students to recite questions rather than improving practical language abilities, since many test questions were directly adopted from the question banks (Yan & Pyne, 2013). Fan, Fei, Schriever, and Fan (2017b) believe some exam questions lack practical value since the focus of these questions is on testing such tricky technical knowledge that even a captain would choose wrong answers. On account of the aforementioned analysis, it was not surprising to find that the online materials were inappropriate to a high proportion of students' individual English level as indicated in the questionnaires. In this case, there was little difference between the online materials and printed materials in terms of content and format if online materials were mainly used to pass the exams. In fact, under such a teaching mode, printed materials are more preferable than online ones since printed materials present less cognitive load compared to online materials (Chang & Ley, 2006). This can partly explain the reason why some interviewees in this research agreed that they preferred the traditional mode to pass Maritime English exams.

6.2.3 Current status of online assessment and feedback

Assessment is among the key factors that influence learning and teaching (Gaytan & McEwen, 2007). However, assessment alone does not ensure the high quality of learning. Only carefully and systematically planned assessments can improve the learning outcomes (Wilson, 2004). Gaytan and McEwen (2007) maintain that a variety of assessments should be employed to meet students' different learning preferences and needs. Sun, Tsai, Finger, Chen, and Yeh (2008) state that diversified assessment methods benefit both students and instructors. For students, various assessments can motivate them to make efforts in different evaluation schemes and build a connection with the instructors. For instructors, evaluation of various aspects of acquired skills and knowledge may make them consider the learning outcomes in different ways. However, the results of this research not only show online assessments were not widely used for current Maritime English study, but also indicate most

of the participants believed their online assessments were not varied in form and did not take students' individual learning preferences into account. In addition, the content of current online Maritime English assessments was largely not authentic for the purpose of real-life communication, while authentic learning and testing content is one of the features of an ESP course (Carver, 1983; Gatehouse, 2001).

Feedback regarding the quality of students' work is a critical component of online assessment to ensure the quality of online courses (Moore & Kearsley, 2011). Learners should be provided with feedback for their assessment so that they know how they are doing and how to improve (Ally, 2008). Multiple forms of feedback, with a consideration of individual needs, can lead to better learning outcomes and higher satisfaction by correcting and improving students' learning activities from different perspectives (Sun et al., 2008). As for online feedback, the questionnaire data indicate providing online feedback was not a common practice in Maritime English education in China. Considerations for individual needs in feedback were still scarce in practice—only 15.7% of the questionnaire participants and 2 interviewees admitted some kind of personalised feedback was provided. It was also found that the use of online assessment was positively correlated with the varied forms and multi-aspect of online assessment reported by participants. Besides, those who reported the use of online assessments tended to report the provision of online feedback. Therefore, more online assessments should be encouraged to be applied to Maritime English education because the limited use of online methods may put a hindrance on the improvement of online assessment and feedback. Palloff and Pratt (2000) state that the frequent use of online methods can improve the quality of online learning.

Both Chinese Maritime English teachers and students regarded "passing Maritime English examinations" as their top priority for English learning (You, 2012) despite the fact that the contents of the examinations cannot meet the needs of seafarers in practice (Fan et al., 2017b). The Maritime English exams in China are primarily composed of multiple-choice questions (Fan et al., 2017b). Hence, this research found that the multiple-choice questions, which could be automatically evaluated through software, were the main form of online assessments. Generally, the design of such software was very simple and only provided limited constructive feedback or explanation apart from the correct answers to multiple-choice questions. As such, the benefit of online assessment and feedback is just limited to providing instant feedback without further constructive comments. If the feedback is simply

in the form of answers to multiple-choice questions, it can hardly contribute to the development of students' critical thinking or their improvement of English proficiency. However, some Maritime English teachers favoured such simple form of feedback because the instant statistical data provided by the software made it easy to check the learning progress of the individuals and the whole class. As such, it greatly reduces the workload of Maritime English teachers in terms of marking and monitoring the learning progress.

The majority of the participants in this research were not satisfied with the current assessments and feedback of Maritime English which were largely centred on Maritime English exams. Many of them believed that the current Maritime English exams could only evaluate students' familiarities with the exam questions instead of their real Maritime English proficiency. Although Chinese seafarers had passed Maritime English exams and obtained seafarers' certificates of competency, many of them still have difficulty in communicating with foreign seafarers on board (Fan et al., 2017b). Therefore, the validity of the current assessment of Maritime English could be doubted.

A relatively low rate of using diversified online assessment and feedback was found in the following two categories: the students studying for an associate degree and those who were in the second year of their studies. In China, the majority of current Chinese maritime students were studying for an associate degree (Wen, 2012). To enhance the general level of online assessment and feedback, the specific needs of this group of students should be examined and considered. Research shows that Chinese college students in the second year often become less disciplined in studying (Li, 2017a). A low rate of using diversified online assessment and feedback would lower their interest in studies, which would be one factor that leads to their indiscipline. To these students, innovative design of online assessment and feedback are especially needed to enhance their study motivation and moral.

6.2.4 Current status of online interactions

Online interaction is an inseparable constituent of effective online instruction (Swan, 2002). Studies found increased interactions were related to better performance and higher learning satisfaction (Bocchi, Eastman, & Swift, 2004; Swan, 2001; Wilson & Stacey, 2004). This research indicates that the practice of online interactions in Maritime English education still needed a great deal of improvement. None of the interaction types this research investigated had an agreement rate of over 50%. Synchronous interaction was the least frequently used in

Maritime English instruction while the student-teacher interaction was the type that was the most frequently performed. More online asynchronous interaction was conducted than the synchronous one. Students interacted more frequently with Maritime English teachers than with their peers.

The interviews revealed that student-teacher interaction mainly focused on explaining the correct choices of exam questions or completing some assignments. Students normally interacted online with the teacher in chat groups or through email. Text communication became the main communication channel in this case. This finding is consistent with the conclusion made by Li (2016) that text communication is the main form of online communication for Chinese students. Teachers' limited technical skills may be one of the major contributors to this problem (Su, Bonk, Magjuka, Liu, & Lee, 2005). As found from the research, although teachers now perceived interaction as an important aspect of successful learning, many of them had difficulty in making their online courses as interactive as they wish. Some teachers admitted they would avoid using sophisticated technologies when designing or delivering online courses.

However, text communication alone has its limitation in solving complicated issues (Swan, 2001). For example, such form of interaction cannot develop the real communication skills that seafarers need in their career. Moreover, text communication lacks other clues, such as facial expressions and body language, to aid learning and would probably lead to text ambiguities (Chen, Pedersen, & Murphy, 2011). Many opportunities that ICT provides, such as voice communication, visual aids and learning platform, cannot be realised through text communication. As such, the text-driven by technology is under criticism about online learning (Thorne, 2003). More innovative strategies in the online interactions should be introduced into Maritime English teaching and learning, such as case studies, debates, role-plays and games (Northrup, 2009).

This research found that most of online interactions among Chinese students occurred out of class rather than in class. The main form was the discussion in the chat groups formed in mobile apps such as Tencent or WeChat. Within the groups, members could send messages in the forms of text, picture, voice and video clip. However, in most cases found in this study, online interactions were largely limited to posting text questions on the screen and seeking answers to the questions. The role of online interactions needs to be emphasised to develop

students' critical thinking ability, increase their engagement and encourage them to express their ideas.

It is noticeable that even in an online environment, Chinese students rely heavily on their teachers during the learning process (Chen, Shen, Fukuda, & Jung, 2015). As reported by the questionnaires, the student-teacher interaction occurred more frequently compared to student-student one. Some interviewees believed that without the proper guidance and supervision from the Maritime English teachers, the learning quality of the chat groups could not be guaranteed and the group would easily be attracted by other topics or go silent. Rourke, Anderson, Garrison, and Archer (2007) believe even simple online interactions among students require a great deal of facilitation. The high reliance on the teacher can lead to a low level of engagement in online interactions, which becomes a major concern for online Maritime English courses in China (Davis, Yang, Xu, & Zhang, 2016). One reason for the high reliance on the teachers is that Chinese students influenced by the traditional Chinese culture are usually too timid to openly express their ideas (Gao & Legon, 2015). Another reason is that some exam questions are very tricky and most peer students had no confidence to figure out the correct answers by themselves (Fan et al., 2017b). In this way, reliable answers were expected to be provided by their teachers.

Currently, online interactions conducted for Maritime English studies were quite simple and limited, which did not contribute to promoting interactions compared to the traditional teaching mode. As reported from the research, a large amount of the participants thought the online interactions conducted for Maritime English studies were not beneficial enough. The current forms of online interactions may influence their practical effect. As discussed above, text communication became the main form of online interactions while it alone cannot embody all the opportunities that ICT provides. Its limitations would quickly drain the learning interest of some students, especially of those with a low level of English proficiency and a lack of online communication skills who need some outside incentives (Li, 2017b). In this research, only a small proportion of maritime students considered their Maritime English level as good (9.8%) or excellent (2.6%) and no Maritime English teachers regarded their students' Maritime English level as good or excellent. Considering the relatively low language proficiency of Chinese maritime students, more interesting and sophisticated online interactions, such as online games and online cooperation, should be introduced into Maritime English education to engage them in online interactions. Special attention should

also be paid to improving students' internet language as well as basic English competence (Fu, 2008).

6.2.5 Current status of related online support

Quality online learning practices are premised on the establishment of an available and supportive online learning environment (Moisey & Hughes, 2008). It is found in this research that the majority of Chinese MET institutions provided some kinds of online tools and peripheral support for students to study Maritime English. A survey shows that most Chinese maritime students possessed at least one online device (Liu & Yu, 2016). The possessing of such online tools and support is one of the prerequisites for the implementation of online Maritime English education in China. However, it was reported that some online tools did not perform stably during the learning process, technical support was not provided timely and online devices provided on campus were not sufficient for students. Improvement is needed in the aspects of internet access and quality. For example, sometimes the internet access in the Maritime English classes was forbidden to avoid possible learning distractions. In addition, WiFi was far less reliable in Chinese universities than that in Western universities (Zhu & Krever, 2017).

Most of the present online support for Maritime English education was limited to technical assistance and library resources. In fact, online learning support comprises a much wider range of considerations, such as study online educational counseling, skills assistance, ongoing program advising and access for students with disabilities (Moisey & Hughes, 2008). More supportive aspects related to online learning should be taken into consideration.

It should also aware that the value of online support depends on the way it is managed or designed. The provided online tools would be perceived as little value when their implementation is ineffective (Armstrong, 2011). For example, timely technical support was closely related to instructor adoption of online teaching (Wang & Wang, 2009) and students' level of learning satisfaction (Lim, Morris, & Kupritz, 2007). If the online library is not well-designed, most of the information repository would be untouched (Moisey & Hughes, 2008). As such, every effort should be engaged in making online support effective.

6.3 Needs for online Maritime English education

6.3.1 Needs for online Maritime English materials

The results of this research show there were notable needs for online Maritime English materials. The immense needs for considering individual learning abilities were manifested in the high agreement rate of the statement that different levels of online Maritime English materials were needed. It is found in this research that in current practice, generally only one set of teaching materials was applied to all levels of learners. There were seldom some supplementary learning materials that were tailored to personal learning differences. The update of the materials was also lagging behind. Some learning materials had been used for decades. Such kinds of learning materials cannot cater to individual learning differences because learners' individual differences were largely ignored. The information from the questionnaires indicates that there was also a relatively strong need for multiple forms of online Maritime English materials. The application of multiple forms of online learning materials can increase students' satisfaction with the course and is one of the major factors for facilitating meaningful learning (Avsec, Rihtaršič, & Kocijancic, 2014). With the aid of the internet, the learning materials with appropriate content and form based on their individual needs are much easier to be obtained than they are done in the traditional mode (Ally, 2008).

6.3.2 Needs for online assessment and feedback

The quantitative data show that the respondents reported higher needs for online feedback than for online assessments. This indicates that Chinese maritime students received very limited online feedback, although online teacher feedback is very important in that it helps students know their learning performance and progress they have made as well as providing necessary coaching (Thorne, 2003). Among the needs related to online assessment and feedback, the research shows that the needs for multiple types of online assessment and feedback were relatively strong. This finding was in alignment with the qualitative results that online assessment and feedback needed to be diversified. It can be referred that the widely used monotonous multiple-choice questions cannot meet maritime students' diversified needs, because such questions are mainly designed to pass Maritime English exams. With this aim, the present multiple-choice Maritime English questions mainly examine the familiarities with the teaching materials rather than test real language proficiency, as some interviewees reported. Thus, these questions could lead to rote learning which would not contribute to improving the language proficiency of maritime students (Drown, Mercer, & Jeffrey, 2006).

6.3.3 Needs for online interactions

Although the importance of online interactions cannot be overemphasised, the needs for online interactions were relatively weak compared to the needs for online materials, online assessment and feedback, and related online support. The needs for student-teacher interactions were the strongest among all the interaction types investigated. Interestingly, asynchronous online interactions were preferred to synchronous ones. This finding contradicts the finding that students prefer synchronous communication to asynchronous communication in one study (Zhang et al., 2016). The difference can be explained by the fact that the participants in the above literature are a group of mixed nationalities who communicated in English. The preference for interaction modes varies between cultures (Gao & Legon, 2015). Another reason for the difference is due to the relatively low English proficiency of Chinese maritime students, which makes them prefer asynchronous interactions to reduce the cognitive load involved (Buckingham & Alpaslan, 2017). If students have insufficient English ability, it is difficult for them to communicate synchronously and they can easily get frustrated. However, due to the fact that communication at sea is mainly conducted synchronously, fostering the ability to interact synchronously is of high value for Chinese maritime students.

6.3.4 Needs for related online support

In this research, the needs for related online support were greater than the other three components: the needs for online materials, online assessment and feedback and online interactions. This finding manifests that the unfamiliarity with the new technology is still one of the obstacles to implementing online education (Ku & Chen, 2015), especially for teachers (Su et al., 2005; Veletsianos, Beth, & Lin, 2016). The lack of support was reported as one major challenge in performing online courses within the Maritime English teachers. The results show there were still 14.3% of Maritime English teachers investigated in the questionnaires with little or no online experience but only 30% of the teachers agreed that some online education training was provided by their institutions. This result is in consistence with the findings of many studies conducted in China that show there was a lack of appropriate knowledge and support for developing courses to unleash the full potential of online learning (Tham & Tham, 2011). During the interviews, some of the teachers expressed their wishes to have more training on how to design online courses, engage students, transit in the new online environment and get the necessary support.

Since a large proportion of Chinese maritime students are from rural or remote areas (Fan et al., 2017b) with limited experience for online learning (Trucano, 2012), they may need assistance in adapting themselves to online learning, although they may know how to operate some basic online tools. Some students in the interview expressed their desire for more assistance in participating in the online Maritime English courses, completing online assignments and solving technical problems. Especially at the beginning of an online course, it is hard for college students to transform their past learning patterns into virtual ones which need more self-discipline and higher self-study ability. Providing clear instructions as to how to go about online learning is definitely necessary (de la Maza, 2009). Nonetheless, such support should be offered from a comprehensive and inclusive perspective instead of just being limited to technical assistance. For example, study skills assistance, how to navigate online learning environment, online educational counseling, ongoing program advising, effective strategies of online learning and guidance for the disabled person should be considered in the online support (Ally, 2008; Moisey & Hughes, 2008).

6.4. Readiness for online Maritime English education

6.4.1 Technical competence

In an online learning environment, individuals' perceptions towards their abilities to implement online courses are of particular importance (Hung et al., 2010). Although "Unfamiliarity with online education" was the least highlighted in this research for not adopting online Maritime English education, it could exert great hindrance in the implementation of online practices (Lei, 2009).

As for technical skills, students, in general, seemed to be relatively confident in their online abilities. More than half of the questionnaire participants in this research believed maritime students had possessed necessary technical skills to support their online Maritime English studies, could find ways to solve technical obstacles that occurred in their online studies and could understand instructions on how to use online tools. This is in alignment with Hung et al. (2010)'s finding that college students nowadays generally have a high level of readiness in technical competence. It should be known that having necessary technical skills is just the prerequisite for online learning (Appana, 2008). It does not mean students do not need related online support, which was manifested in Part C of this investigation and other research (Margaryan, Bianco, & Littlejohn, 2015; Porter, Graham, Bodily, & Sandberg, 2016).

However, the Maritime English teachers' self-perception towards technical competence was not so optimistic. The research found that a much higher percentage of Maritime English teachers has little or online experience than that of the maritime students. Half of Maritime English teachers interviewed lacked confidence in using online tools to support online Maritime English education. They would avoid using sophisticated technologies when designing or delivering online courses. A reason account for it was that the adoptions of new technologies need a significant amount of time and effort to master them skilfully (Su et al., 2005). Under the pressure that comes from administrators, Chinese Maritime English teachers have put great efforts in helping students pass the Maritime English exams (Yan & Wang, 2017) and thus have no energy and passion to learn or practice online teaching methods. This is reflected in the comments made by some interviews that the traditional Maritime English education mode was preferred in order to prepare students for passing the Maritime English exams.

Studies found that unfamiliarity with technologies would lead to a negative attitude towards new online methods (Gagnon et al., 2007; Lei, 2009; Reid, 2012). Shea, Pickett, and Li (2005) believe that faculty acceptance and the use of online technologies are crucial to the spread of innovation in higher education. Teachers' low level of technical competency may partly explain why the majority of Maritime English classes were still dominated by the traditional teaching mode despite the fact that some online platforms already existed. Therefore, more attention should be placed on those inexperienced teachers because online education will not be effective without the involvement of teachers, especially at the initial stages (Redmond, 2011).

6.4.2 Self-efficacy and self-management of online learning

Since technical competence has been discussed in the previous section, self-efficacy here mainly relates to confidence in online communication and adaptation to online learning environment. The results of this research show confidence level in online Maritime English communication was ranked relatively low. More than half of questionnaire respondents reported they were not confident enough in online Maritime English communication. The lack of confidence in English communication indicates students might not have adequate language proficiency and/or feel anxious when using English (Clément & Kruidenier, 1985). When maritime students become seafarers after graduation, low language confidence still

exists. Research shows that only a quarter of Chinese seafarers believed that they had confidence in communicating with foreign seafarers (Fan, 2017).

Because of traditional Chinese cultural value and their low communication competence (Yu, 2009), Chinese students are normally reluctant to participate in English communication in the classroom. It is noticeable that marine-engineering-majored students had a lower level of confidence in their communication ability than Navigation-majored ones. This is probably because of the characteristics of their future work. Bridge navigating officers are more exposed to external communication (ship to ship and ship to shore communication) than marine engineers who are mainly confined within the engine room below. Therefore, marine-engineering-majored students felt relatively inferior in their communication due to their limited usage. However, having the ability to conduct "effective communication" is the requirement for all crew on board as stipulated in STCW Manila Amendments. Therefore, more attention should be paid to Chinese marine-engineering-majored students in practical Maritime English instruction.

Online methods can increase maritime students' confidence in participating in Maritime English communication. Research shows that online communication can significantly reduce individuals' anxiety or nervousness compared to face-to-face communication (Hammick & Lee, 2014). With the increasing involvement in online learning, maritime students' confidence in online communication can be gradually enhanced. In addition, the respondents of this research showed a relatively high agreement on their ability in adapting themselves to online Maritime English learning, which is necessary for effective online learning (Cercone, 2008).

An online learning environment enables students to study more flexibly, giving them the freedom to arrange their own studies at their preferred learning paces (Hung et al., 2010). Thus, self-management is an important factor in online learning. The results of this research show the investigated factors concerning students' autonomy received the lowest rate of agreement among all the measuring items of readiness for online Maritime English education. The low autonomy of Chinese maritime students can be partly explained by the fact that they are used to a prevalent teacher-dominated learning environment which undermines their self-directed abilities in language learning. Nisbet, Tindall, and Arroyo (2005) maintain that with a currently prevalent teacher-centred and test-oriented approach, Chinese college students' initiative in English learning has not typically been emphasised. Promoting student's

autonomy in Maritime English learning would contribute significantly to addressing persisting issues, such as students' high dependence on teachers, varied levels of English competence, tight timetables of maritime study as well as the shortage of qualified Maritime English teachers (Hozayen, 2009).

Online distraction, which has a negative correlation with Chinese students' learning effort (Xu, 2015), has become a major concern for the implementation of online learning. The participants of this research showed a relatively low agreement on students' ability in handling distractions. This finding is in alignment with the qualitative result in this research that "Distraction by irrelevant online activities in class" was one of the major reasons why online Maritime English education was not preferred. Maritime English teachers expressed more concerns about this issue than students themselves.

In fact, online distraction and learning autonomy are influenced by each other. Benson (1997) believes that being easily distracted online indicates a lack of inner capacity for self-regulation of learning which is regarded as one of the measurements of learner autonomy. Thus, it can be inferred that students' vulnerability to online distractions was another testament to their low level of autonomy. It is found by some researchers that some online methods have the potential to improve the level of learning autonomy while minimising the effects of online distractions (Steffens, 2006; Yan & Wang, 2017). For example, incorporating self-monitoring system into Maritime English education and providing constructive feedback are beneficial to promote autonomous learning (Steffens, 2006; Yan & Wang, 2017).

Around half of the questionnaire respondents agreed or strongly agreed that students were willing to spend spare time participating in training for online learning. However, the proportion of the participants who were willing to spend spare time in online training was much lower than that of the participants who expressed their needs for related online support. This implies that some respondents were not willing to take some extra time for such training in spite of their notable needs for online support. As mentioned in Section 6.2.5, online support has diversified forms. As such, designing support requires an understanding of individual preferences and circumstances (Moisey & Hughes, 2008).

6.4.3 Motivation for online learning

Motivation, which can significantly raise learners' effort, exerts a profound influence on the effects of online learning (Sun, Franklin, & Gao, 2017). Regarding motivation for online learning, a majority of the questionnaire participants in this research agreed that online learning could motivate them in Maritime English studying. This supports Hozayen (2009)'s finding that the use of online technology can increase maritime students' motivation in the learning process.

Interestingly, despite the lack of confidence in English communication, the respondents in this research expressed a strong willingness to share ideas with others and to use online tools to enhance their online participation. The reported willingness to share with others but lack of confidence to communicate is in alignment with the finding of Fan (2017) that most Chinese seafarers are willing to communicate with foreign seafarers despite their lack of confidence in English communication. For seafarers, such desire could be stronger on board due to a lack of communication channels at sea with their families and friends.

Even though some kinds of online methods were incorporated into current Maritime English education, many participants therein still believed that they were not quite ready for the online Maritime English learning especially in the terms of online distraction, confidence in English communication and autonomous learning. It is suggested that some aspects of online learning environment, such as conducting interactions, providing constructive feedback, and introducing self-monitoring system, are effective in handling these problems (Schraw, 2007). To gain the best results of online learning, it is important to know that these three factors are reciprocally related to each other and they work collaboratively over the learning process.

6.5. Recommendations for blended learning in Maritime English education

As mentioned in Chapter Five, the recommendations resulted from the qualitative analysis were summarised into the four categories: 1) Blended learning; 2) Adjunct mode; 3) Fully online learning; and 4) Others. The results show that blended learning was the most frequently recommended mode followed by adjunct mode and fully online learning mode. The highlighted blended learning mode in this research is consistent with the statements by some scholars that blended learning is appropriate and feasible for Maritime English learning and teaching (Ferreira, 2014; Pritchard et al., 2013; Wet, 2013). Since blended learning may

provide more opportunities for interaction which is necessary for language learning, blended learning appears to be a suitable approach for achieving the requirement of “effective communication” among seafarers as amended in STCW 2010 (Cole & Trenkner, 2012). On account of the nature of the maritime sector, Wet (2013) believes that blended learning is an appropriate and viable vehicle for Maritime English teaching and learning. Yu (2015) maintains that blended learning is applicable to Maritime English teaching in China. Empirical evidence also shows that blended learning was successfully applied to Maritime English basics courses on account that much more hands-on communication practices were conducted in class and students’ oral English ability was substantially improved (Ferreira, 2014).

Given the current situation and needs for online Maritime English education, blended learning is recommended to achieve an optimal Maritime English learning environment in China because it harnesses the strengths of both online and traditional learning modes (Lotrecchiano, McDonald, Lyons, Long, & Zajicek-Farber, 2013). In order to choose appropriate and effective blended English learning for maritime students, the recommendations for blended Maritime English education are associated with the flowing five aspects: Maritime English online learning materials, Maritime English assessment and feedback, online interactions, related online support and Maritime English teachers.

6.5.1 Recommendations for Maritime English online learning materials

Since self-study with online tools has been recommended in the IMO Maritime English Model Course 3.17, online learning materials can be integrated into Maritime English curriculum (Choi & Park, 2016). The results of this research show that maritime students had a strong need for online learning materials, so much more online Maritime English resources need to be designed, developed and introduced to students. But online learning system should not be simply regarded as another form of distribution for learning materials on account that boring and unvaried learning materials could quickly drain students’ learning interest and motivation. To make the most of online attributes, individual preferences (Ally, 2008) and authentic materials (Kozma, 2001) should be considered when preparing online learning materials.

Various forms of online materials, such as audios, videos, and courseware supported by animation and multimedia, should be applied in the learning process so that students can

choose appropriate activities according to their own learning styles (Tham & Tham, 2011). Both forms and contents of online learning materials need to be varied and tailored to the needs of students (Ally, 2008). A pre-grouping of students according to their various Maritime English levels is necessary before choosing or designing online learning materials (Tavangarian et al., 2004). After the pre-grouping, learning materials should be categorised and grouped according to topics and language difficulty levels. For better student-content interaction, online materials should incorporate the functions, such as individual compilations, topical rearrangements and annotate and cross-reference materials (Tavangarian et al., 2004).

Authenticity is one of the major principles when compiling Maritime English textbooks to achieve effective communication competence (Li & Luo, 2015). Authentic materials refer to the materials that are taken from real-life practice rather than being produced specifically for language learning (Mutz, 1999). On account of the current status of Maritime English textbooks, more online authentic learning materials need to be made available to Chinese maritime students. Holland (2016) maintains that providing seafarers with authentic materials relevant to their jobs is warranted and necessary in Maritime English education. The same can also be applied to maritime students who are the potential seafarers in the future. Research shows that using authentic materials in Maritime English classroom not only contributes to the development of general and technical English vocabulary, seafaring knowledge, pronunciation, listening and speaking skills, but also increases students' motivation, confidence, and engagement in their communication (Albayrak & Yanar, 2013; Jurkovič, 2013). In addition, online authentic materials can help Chinese maritime students who normally do not have sea experience to familiarise themselves with real-life situations on board. Given the fact that Chinese seafarers are especially weak in verbal communication (Fan et al., 2017a) which is the most frequently used means of seafarers' communication (Trenkner & Cole, 2010a), online learning materials with real-life communication, authentic activities and meaningful tasks are helpful to improve this aspect (Kayi, 2006).

6.5.2 Recommendations for Maritime English assessment and feedback

Before designing and implementing an online assessment, it is important for both students and teachers to make clear of the purpose, the criteria and the intended targets of the assessment (Gaytan, 2002). Effective online assessment techniques should not only embrace the good traditional techniques, such as encouraging critical thinking and motivating students, but also require a more innovative and systematic approach than that used in traditional

education (Gaytan & McEwen, 2007). The quality of online assessment should be aligned with the subject content, cognitive processes, and end results (Anderson, 2008).

Baxter, Elder, and Glaser (1996) suggest four elements: coherent explanations, plans for problem solution, implementation of solution strategies and adjustment for the learning activities, are required to complete an assessment. From this point of view, many synchronous communication opportunities between students and teachers should be created to guide the completion of assessment. The capacity of online learning provides good opportunities to design better assessment activities, such as the assessments that are content or project based, the ones that provide the opportunities for self-assessment, the ones that are constructed collaboratively, and the ones that assess both cognitive processes and course objectives (Anderson, 2008).

As stated in Section 6.2.3, the present assessment of Maritime English is largely centred on passing Maritime English exams because the content and the design of current Maritime English exams are not well aligned with the expected outcomes of Maritime English education (Chen, 2011a). Both Maritime English teachers and maritime students interviewed in this research recommended that the focus of Maritime English exam should be put on improving students' communication proficiency with various forms of questions rather than on the fixed and impractical question banks. Instead of being tested in Maritime English exams, the technical-knowledge-focused question items were recommended to be distributed and incorporated into the exams of subject courses, such as courses of navigational equipment, cargo transport and management, ship handling and maritime regulations. Maritime English courses should put more emphasis on improving English communication ability in practice rather than on teaching the technical English vocabularies and their usages, which could be taught in subject courses. On the one hand, this shift in focus can relieve the burden of Maritime English teachers who have limited maritime knowledge and spend substantial time to explain unfamiliar technical vocabulary and knowledge in the Maritime English classes. On the other hand, learning technical vocabulary outside of the Maritime English classes can save more time for maritime students to practice English in class.

To fulfill the new language requirements stipulated in STCW Manila Amendments, Maritime English assessments should place more emphasis on testing the communication ability in real-life situations than on examining technical vocabulary and language structures (Pritchard et al., 2013). Therefore, Maritime English assessment should strive to use authentic scenarios

which seafarers may encounter in their work (Holland, 2016). The content of Maritime English examinations can refer to those well-developed ones, such as MarTEL, Marlins tests, Marine Soft TOME (Test of Maritime English), TOMEC (Test of Maritime English Competence) and IMETS (International Maritime English Testing System).

Teachers' immediate feedback to students positively relates to students' learning outcomes and satisfaction (Küçük, Genç-Kumtepe, & Taşcı, 2010). With an online learning management system, teachers can monitor progress, provide feedback and boost confidence through online methods, especially for those who are falling behind or feeling isolated in English learning (Marsh, 2012). Constructive and specific feedback plays an important role in blended learning, where students should be more self-regulating (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011). Shute (2008) finds that effective feedback is expected to focus on the learning objective and be specific, unbiased and clear. However, providing such constructive feedback may greatly increase the workload of Maritime English teachers (Anderson, 2008). One of the strategies to minimise direct impact on workload is to establish collaborative learning environments where students can assess their own learning in online groups. Peer feedback is another effective tool for the assessment of online assignments (Xie, Ke, & Sharma, 2008). It enables maritime students to take their initiatives in autonomous and collaborative learning while, to some extent, decreasing teachers' heavy workload of providing detailed and constructive feedback.

6.5.3 Recommendations for online interactions

The participants in this research generally thought online interactions were greatly needed in Maritime English studies, but currently, there were limited online interactive activities being practiced in class. Research shows that Chinese students seldom take the advantage of online tools for the purpose of interactions and most of them use online tools for non-interactive activities, such as looking up an online dictionary (Li, Li, & Li, 2016). Since some Maritime English teachers argued that interactive activities were constrained by limited class time, it is expected that students can increase interaction opportunities by using information technology in and out of the classroom as part of the learning process. For example, students can learn basic English knowledge by watching recorded lecture video clips at home, thus leaving more time focusing on hands-on communication practices in class (Ferreira, 2014).

On account that Chinese students are likely to be reliant to their teachers in the learning process (Chen et al., 2015) and tend to be inactive in the interactive activities (Davis et al., 2016), Maritime English teachers should design attractive online activities to enhance student engagement. For example, instead of imparting knowledge, teachers should put more focus on asking questions and engaging the students at different levels (Inayatullah, 1999). Discussion boards and chat rooms can be used to keep students motivated in the course by encouraging them to share and jointly solve problems with their peers (Reeves, Herrington, & Oliver, 2002). Teachers should find ways to engage students through collaborative group work, peer assessment, and varied feedback which can be supported through ICT (Reeves et al., 2002). Those with low self-efficacy in online communication should be given special encouragement to participate more extensively in the discussions, to openly express their ideas, and to seek assistance when facing problems online (Hung et al., 2010). Due to the fact that communication at sea is mainly conducted synchronously, fostering the ability to interact synchronously is of high value for Chinese maritime students.

Some interviewees in this research expressed their wishes to increase collaboration in their Maritime English studies. The applications of ICT in educational environments have been more widely perceived as a way of enhancing collaborative conversations and ensuing construction of understanding than just as a cognitive delivery medium (Harasim, 2000). Online learning communities, which are built to support both formal and informal learning in and out of the classroom (Richards & Tangney, 2008), can be used as a good way to achieve this purpose. According to Anderson (2008), being community-centred is one of the characteristics of effective online learning, which can both provide high quantity and quality of assessment and maintain student motivation. In constructivist point of view, English leaning is a knowledge construction process which occurs in social activities (Clark, 2004). The social component can be highlighted in an online learning community. Wenger, McDermott, and Snyder (2002) found in a learning community where members support and challenge each other, more effective and relevant knowledge was constructed and created. The absence of the authorised role of a teacher in an online learning setting can be compensated by the distributed expertise of learners who are encouraged to volunteer their contributions through instructional design and strategies (Nagel & Kotzé, 2010). The levels of interactions and collaboration can both be enhanced in an online learning community by discussing topics and sharing the knowledge in their specific domain among students and teachers (Liu, Chen, Sun, Wible, & Kuo, 2010).

However, teachers should design the interaction according to students' needs and preferences (Su et al., 2005). Hirumi (2006) believes that overuse or misuse of interactions can cause failure in teaching and learning, especially for novice online learners. Learners may feel dissatisfied if they find the interactions are a set of meaningless work, such as the interactions either too easy or too difficult for learners. Furthermore, too much interaction may intimidate students and overwhelm teachers.

6.5.4 Recommendations for related online support

Teacher ability matters more in a digital era if teachers need to employ online technology to help students engage in personalised and collaborated learning (Er & Er, 2013). This research indicates Maritime English teachers greatly need related online support for their teaching. They generally agreed that they needed professional training for the purpose of integrating online technology tools in classroom activities. As much as teachers are encouraged to have an open attitude towards technology innovations, they often feel comfortable in using the teaching methods that they are familiar with instead of being creative, especially when considering the time and effort need to be taken at the initial stage (Su et al., 2005). Online Maritime English education still seemed to be daunting to some Chinese Maritime English teachers interviewed in this research.

To raise the adoption rate of innovations, some support should be taken to help teachers shorten this transitional process. In-service training is a very helpful instrument to empower teachers with necessary knowledge and skills (Er & Er, 2013). In developing the skills of teachers, such training should include not only the skills required to operate the software and the learning management system but also the related instructional design skills so that the teacher can integrate learning activities into their classroom (Wilson & Stacey, 2004). It should be aware that having necessary online skills is just the first step for blended learning. To make online teaching effective, teachers should also invest substantial efforts in many other transformations, such as teaching approach and pedagogy (Redmond, 2011).

Support for students is also one of the vital factors affecting the learning outcomes in an online learning environment (Rovai & Downey, 2010). This research found the participating students reported immense needs for online support. Before providing online support to students, it is crucial to identify learners' needs and preferences (Moisey & Hughes, 2008). It may result in a more favourable course satisfaction if a variety of supports were available to

students, enabling them to have a choice that is tailored to their learning styles. Orientation programs that provide learning guidance should be available to students (Lu, Jiang, & Throssell, 2013). Furthermore, technical support, study skill assistance, education counseling, digital library, and access for students with disabilities should be considered to enhance students' online experience (Ally, 2008). It is also imperative that the access to online support is easy for students (Lee et al., 2011). For example, students should be provided with explicit information on where and how to get assistance.

Providing free WiFi access and computer use on campus is also in pressing needs of students and teachers. The accessibility of on-campus online learning infrastructures, such as the internet and computers, is still problematic for many campus students in China (McConnell & Zhao, 2006). The employment of online learning infrastructure and internet speed and stability are the basic technical support for online Maritime English learning. Only in some places, such as the library and lab, free WiFi connection services with varying internet speeds are available on some campuses (Liu et al., 2016).

6.5.5 Recommendations for Maritime English teachers

Blended learning reinforces the learner-centred philosophy in which teachers are not regarded as the only knowledge source and instead peer support and a sense of community needs to be established (Marsh, 2012). It should be aware that teachers who have learner-centred philosophy do not necessarily follow learner-centred practice because of the long-lasting influence of teacher-dominated educational practices and a lack of essential learner-centred teaching skills (Er & Er, 2013). This research found that the exam-oriented and teacher-centred teaching mode has not been changed much even though some Maritime English classes were conducted via online tools. This calls for a shift in teachers' role from an authoritative mentor towards a learning facilitator that helps students develop self-directed study skills and attitudes (Volery & Lord, 2000). A combination of technologies and teachers' intervention can exert a positive effect on blended learning courses (Tsai, 2011). That means Maritime English teachers should not only be fluent in English, master the professional knowledge in maritime area and be familiar with updated information and technology related to their teaching, but also be effective coordinators and facilitators to support the student-centred learning environment.

Given the high dependency on teachers in Chinese culture, a smooth transition is needed from the traditional face-to-face learning environment to the environment of blended learning. In a teacher-centred teaching approach, students tend to follow the instructions and requests from teachers who have the authority in their learning (Hozayen, 2009). In student-centredness, students mainly learn by doing themselves—perhaps with the assistance from the teachers (Ho & Crookall, 1995). It is essential for the teacher to help students take on the responsibility for their own learning in blended learning (Er & Er, 2013). Instead of imparting pre-planned knowledge, teachers need to encourage, motivate and guide students in learning activities, such as conducting their own learning, mastering self-discipline, and being active contributors to instruction (Er & Er, 2013; Garrison, Cleveland-Innes, & Fung, 2004).

Since many participating students reported a lack of self-discipline in their Maritime English studies, a pre-test or questionnaire can be used before the course to clarify the entry level and individual preferences of students so that teachers can design and instruct the course in accordance to students' specific needs. For some freshmen, it is really tough to make adjustments from their high schools to colleges (Hung et al., 2010). If they are found to be unable to discipline themselves in the independent study mode, teachers may consider delaying the implementation of online methods (Hung et al., 2010). Another suggestion is that teachers may provide more guidance to these students and start from the online learning activities that can be controlled by teachers, such as structured discussion of the given topics (Wu & Hiltz, 2004). At the beginning of an online course, clearly stated syllabus, purposes, and objectives of the course should be offered to the students so that they can direct themselves in the process of their learning. Students should also know where and how to obtain technical and academic assistance. During the learning process, it is imperative for teachers to help students develop the skills they require to work autonomously and collaboratively, such as time management skills, learning skills, and online communication strategies. Teachers can, if necessary, send reminders or make calls about the deadlines, requirements, and tests to further assist and better engage those relatively passive students.

To keep students' motivation in learning, supportive and quick assistance and intervention should be provided when students experience difficulties or feel discouraged during the learning process. The technological tools, such as virtual meeting software and instant messaging, can be applied in the immediate communication (Baker, 2004). The teacher can begin the course with an induction to make students familiar with their teacher and peers

through online tools (Hung et al., 2010). Apart from the learning objectives of the whole course, the objectives of each unit, assessment measure and intended outcomes should also be provided to students because small steps of progress can give students great motivation in their learning (Amabile & Kramer, 2011). Constructive and timely feedback should be available to students because feedback can greatly inspire students' motivation, enabling them to better self-regulate their learning (Narciss & Huth, 2004; Trigwell, Prosser, & Waterhouse, 1999). Increasing student participation in task-oriented learning activities is also a good way to keep students motivated (Park & Choi, 2009).

White (2006) believes that online learning programmes are more influenced by human factors than technical ones. As such, teachers should be aware that it is hardly possible to motivate a student through the learning resources that do not fulfill his/her needs and it is essential to provide flexibility and adapt to individuals' needs (Marsh, 2012). In this research, the respondents expressed strong needs for individual preferences in many aspects, such as assessment and feedback, learning materials and online support. It is suggested that considerations for individual needs should be incorporated into every aspect of blended learning. The flexible blended learning environment makes it possible to be responsive to students' diverse learning styles, needs, and expectations (Mupinga, Nora, & Yaw, 2006).

However, Maritime English teachers sometimes find it difficult to pay sufficient attention to individuals and provide guidance when teaching in a large class. Integrating online methods into teaching provides feasible improvement for large classes (Concannon, Flynn, & Campbell, 2005) that were common in Maritime English education in China. For example, internet-based self-learning programs can cater to the learning needs of students of varied English proficiency levels (Youssef & Taher, 2005). A repertoire of online learning media, activities and materials can be developed to accommodate the diverse contextual and student needs (Anderson, 2008; Marsh, 2012). Relevant video or audio lectures can be prepared for those with a low English level so that they can watch them before and after class to get better outcomes of their learning (Brecht, 2012).

6.6 Summary

Based on the research objectives and research questions, this chapter has discussed the results of the quantitative and qualitative data analysis in the previous two chapters with reference to the research findings described in the literature review. Recommendations for online

Maritime English education in China have also been included in the chapter. It was revealed that the current status of online Maritime English education in China was still in its early stages. Generally, online Maritime English teaching in China was more or less limited to the adjunct mode, which means the existing online tools were simply used as a medium of instruction rather than as an integrated part of the learning process. The exam-oriented teaching mode greatly impeded the implementation of creative online methods. This research also found that there was a strong need for online Maritime English education—all the investigated issues related to the needs for online Maritime English education generally had a high rate of agreement. As for the readiness of online Maritime English education, the results showed a relatively high level of motivation and technical competence while students' self-efficacy and self-management of online learning were relatively low. It is worth noticing that some Maritime English teachers had a low level of technical competence and this would lead to a negative attitude towards the adoption of new online methods.

As a result of the analysis of this research, a blended learning approach was recommended for Maritime English education. The recommendations for blended Maritime English education were associated with the following five aspects: Maritime English online learning materials, Maritime English assessment and feedback, online interactions, related online support and Maritime English teachers. Authentic materials should be considered when preparing online Maritime English materials. It is vital for the Maritime English exam designers to learn from the well-developed ones and reform the current exam system to some extent. It is suggested that Maritime English teachers should increase opportunities for collaboration among students and design attractive online activities for enhanced student engagement. A wide range of online support should be considered to improve online Maritime English learning experiences. Teaches should change their role from an authoritative mentor towards a learning facilitator. Considerations for individual preferences should be highlighted in every aspect of blended learning.

The following chapter is the conclusion of the thesis. It makes a summary of the research journey, including the overall research process, the research aim and objectives as well as the main findings of the research. In addition, it probes the research limitations and suggests directions for future study.

Chapter 7 Conclusion

7.1 Introduction

The previous chapter has provided discussions of findings and recommendations in this research. This chapter, as the last part of the thesis, provides the conclusion of the whole research journey. Firstly, this chapter provides an overview of the entire journey. Secondly, this chapter reviews the main findings of the research and the recommendations proposed after discussions. Thirdly, it outlines limitations of this research before implications are provided towards future research on online Maritime English education in China. Lastly, it is concluded with some key issues about online Maritime English education in China which are highlighted in this research.

7.2 The overall research process

As mentioned in the chapter of Introduction, the initial motivation of this research stemmed from the unsatisfactory outcomes of Maritime English education in China and the tremendous potential of online learning. The English proficiency of many Chinese seafarers is disappointing despite the time and effort devoted to Maritime English (Yan & Pyne, 2013). Language barrier is one of the major reasons that make it difficult to increase the share of Chinese seafarers in the global maritime labour market (Fan et al., 2015a). The traditional face-to-face teaching may have its limitations to improve Chinese seafarers' English proficiency (Fan et al., 2015a). A further investigation shows that there is scant empirical research on the feasibility of online Maritime English education in China. Therefore, this research is devoted to improving the outcomes of Maritime English education in China through online methods.

To attain this aim, an investigation regarding online Maritime English education in China was carried out based on maritime students' and Maritime English teachers' perspectives on this research topic. The research was designed to explore the current status of online Maritime English education in China, the extent to which Maritime English teachers and students were in need of and ready for online Maritime English education, and to provide appropriate recommendations for online Maritime English education in China.

In this study, both quantitative and qualitative methods were employed to investigate the research questions. This kind of mixed methods has the advantage of gaining both broad and deep insights of the participants into the researched issues. The research instruments in this study included questionnaires for collecting quantitative data and semi-structured interviews for qualitative data. SPSS Version 23 was adopted to analyse quantitative data and NVivo Version 11 for qualitative data. The target population of this research was maritime students and Maritime English teachers from various MET institutions in China.

The primitive design of the questionnaire items was adapted from the QM Rubric Standards of online learning, the principles of needs analysis and influential frameworks of online readiness. It was later refined and validated by EFA and Cronbach's Alpha coefficients. A total of 255 valid online responses from 234 maritime students and 21 Maritime English teachers were used for data analysis. Quantitative statistical tests, such as descriptive analysis, Kruskal-Wallis test, Mann-Whitney U test, Spearman's Rho test, EFA and SEM, were applied to analyse the data obtained from the questionnaires. The participants in the semi-structured interviews included 12 maritime students and 12 Maritime English teachers in Chinese higher MET institutions. The semi-structured interviews included the four pre-determined questions and further expanded questions were asked when necessary. In this study, thematic analysis and three-step coding were adopted to identify the dominant categories and themes developed from the data of the interviews.

This research has achieved its research objectives within a reasonable time span. This study aims to investigate the feasibility of adopting an online Maritime English learning mode in China as an alternative solution for improving the English communication ability of Chinese maritime students. Based on the research aim, research objectives were unfolded and discussed in previous chapters in terms of 1) Current status of online Maritime English education in China; 2) Needs for online Maritime English education in China; 3) Readiness for online Maritime English education in China; and 4) Recommendations for online Maritime English education in China. Significant results were found in the current status of online Maritime English education in China, the extent to which Maritime English teachers and students were in need of and ready for online Maritime English education. After a detailed discussion, appropriate recommendations were made.

7.3 Main findings of this research

Up till now, very limited and simple online methods have been used in the current system of Maritime English education in China. Although some kinds of online platforms ~~is~~ are now available for Maritime English studies, a majority of the Maritime English classes in China have been dominated by the traditional teaching mode. Even though online tools or methods are applied to some Maritime English classes, they tend to play a supportive role instead of an integrated part of the learning process. A low level of engagement and efficiency were found in online activities designed for Maritime English study. The use of online technology, which in most cases played an adjunctive role in Maritime English education in China, cannot add much value in improving maritime students' Maritime English proficiency.

According to the results of this research, the primary reason for not adopting online Maritime English education was the high priority of passing Maritime English exams. The long-standing exam-oriented teaching mode greatly impeded the implementation of creative online methods in Maritime English study. The existing Maritime English exams, which predominantly focus on testing technical knowledge in English by multiple-choice questions, cannot act as a facilitator for improving Maritime English (Fan et al., 2017b). The other reasons that were found to impede the integration of online methods into Maritime English education included: distraction by irrelevant online activities in class; the belief in individual effort regardless of teaching modes; limited Maritime English class time; limited number of students in some classes; lack of interest in online education; students' low English proficiency and lack of independent learning ability; and unfamiliarity with online teaching and learning. The following three sections will outline the main findings related to the current status of, the needs and readiness for online Maritime English education in China.

7.3.1 Current status of online Maritime English education in China

The part of the current status of online Maritime English education in China explored four components: online materials, online assessment and feedback, online interactions and related online support. Although some online materials were applied in Maritime English education, it was reported that their forms were simple and outdated, and their content could not meet the practical needs and standards. The presently used online Maritime English materials were mainly in the text form of digitalised exam question banks without consideration for individual needs. The online materials had little advantage over the printed

materials if the main aim of Maritime English education was to pass the exams. In fact, under such a teaching mode, some students and teachers preferred printed materials than online ones since the former presents less cognitive load (Chang & Ley, 2006).

The results show that online assessments and feedback were not commonly practiced in the current Maritime English study in China. Very limited forms of online assessments and feedback were provided, such as the multiple-choice questions and the simple answers to these questions. Generally, the current online assessments and feedback were provided without the considerations for individual needs. The content of online Maritime English assessment was largely not authentic for the purpose of real-life communication. The benefit of online assessment and feedback was mainly limited to multiple-choice questions without further constructive feedback from the teachers, which could hardly contribute to the development of students' critical thinking or the improvement of Maritime English level. The research found that more diversified forms of online assessments and feedback should be provided according to the needs of Chinese maritime students.

It is found that the benefit of online interactions was quite limited for Maritime English education at the current stage. Students were dependent on their teachers in online interactions, as shown in the research that the student-teacher interaction was the most frequently used type in Maritime English interactions in China. However, online interactions with Maritime English teachers were largely limited to seeking explanations for the questions. Students normally interacted online with the teachers in chat groups or through email. Some efforts should be paid to improve synchronous interaction because this type of online interaction was reported as the least frequently used one among all the investigated types. Due to Chinese traditional culture (Gao & Legon, 2015) as well as students' low language proficiency and communication skills (Fu, 2008), a low level of engagement has become a major concern for online Maritime English courses in China. To design and implement quality online interactions, Maritime English teachers need to improve their technical skills and transform their roles in an online learning environment (Su et al., 2005).

The research found that some basic online support was provided by the majority of Chinese MET institutions, although the quality of such support was expected to be enhanced. Most of the present online support for Maritime English education was limited to technical assistance and library resources. Other aspects, such as online educational counseling, study skills

assistance, ongoing program advising and access for students with disabilities, should also be included in online Maritime English education (Ally, 2008).

7.3.2 Needs for online Maritime English education

The part of needs for online Maritime English education included four components: online learning materials, online assessments and feedback, online interactions and related online support. The findings suggest that the research participants showed a strong need for online Maritime English education in every component investigated. It also shows a great need for consideration of individual preferences in every aspect of online learning. For online learning materials, the participants reported multiple forms and levels of online Maritime English materials were needed in order to cater to different individual needs. In addition, they agreed that online assessments and feedback needed to be diversified and focus on real-life English proficiency. As for online interactions, the needs for student-teacher interactions were the strongest among all the online interaction types investigated. Although the participants preferred asynchronous online interactions to the synchronous ones, more encouragement should be offered to foster the ability to interact synchronously given the fact that communication at sea is mainly conducted synchronously. The needs for related online support were the strongest among all the investigated components of online needs. The teachers wished to have more training on how to design online courses, engage students, adapt to the new online environment and get necessary support, while students needed more assistance in participating in an online course, completing online assignments and solving technical problems.

7.3.3 Readiness for online Maritime English education

The part of readiness for online Maritime English education investigated three aspects: technical competence, self-efficacy and self-management of online learning, and motivation for online learning. The research found that maritime students showed more confidence in technical competence than Maritime English teachers. Although most Maritime English teachers believed online methods would be beneficial to Maritime English education, they would avoid using sophisticated technologies when designing their courses. Students' autonomy in study and their ability to resist online distractions, which were interrelated with each other (Benson, 1997), were relatively low. However, most maritime students believed they had the ability to adapt themselves to online Maritime English learning. It is noticeable

that although the participants reported a relatively high level of needs for related online support, their willingness to spend their spare time participating in the training for online learning was reported to be relatively low. As such, designing online support needs to take individual preferences and circumstances into account. The participants of this research showed a strong motivation for online study for the purpose of improving Maritime English proficiency. Not only did they believe that online learning could motivate them in Maritime English study, but they also had a strong willingness to share ideas with others and to use online tools to enhance their online participation.

Regarding Chinese maritime students' level of readiness of online learning, this research found that the factor of motivation had the highest level, followed by technical competence. Self-efficacy and self-management of online learning were reported as the lowest factor among the investigated readiness determinants. Despite their strong needs, participating maritime students indicated a relatively low level of self-efficacy and self-management, especially in the aspects of online distractions, confidence in English communication and autonomous learning. Technical competence, self-efficacy, and self-management of online learning and motivation are related to each other and contribute to ensure the best results of online learning.

7.3.4 Recommendations for online Maritime English education in China

Among learning modes, blended learning was the most recommended one for Maritime English education in China. Recommendations for blended learning were provided from five aspects of Maritime English education in China: Maritime English online learning materials, Maritime English assessment and feedback, online interactions, related online support and Maritime English teachers.

Although online materials were used in Maritime English education in China, a great deal of effort is needed to enhance quality. When choosing online materials, it is important to avoid using boring and unvaried materials. In addition to the most frequently used text materials, some other forms, such as audio, video, and courseware supported by animation and multimedia, can be applied in Maritime English learning. Furthermore, multiple functions, such as individual compilations, topical rearrangements and annotate and cross-reference materials, can be incorporated into online learning (Tavangarian et al., 2004). More importantly, authentic materials should be used in blended learning (Kozma, 2001).

Individual needs is another imperative consideration for choosing online materials (Ally, 2008).

Effective online assessments should be innovative, systematic, encouraging, motivating, and aligned with the subject content, cognitive processes, and end results (Anderson, 2008). Clearly stated purpose, criteria and intended aims of the online assessment are important in ensuring the quality of online assessment (Gaytan, 2002). To help students complete online assessments, many synchronous forms of communication between students and teachers should be conducted to enhance students' comprehension of the questions. Some well-developed online Maritime English examinations, such as MarTEL, Marlins tests, Marine Soft TOME, TOMEC and IMETS, can be used as the references for designing online assessments. To improve the validity of Maritime English tests, it is recommended that the technical-knowledge-focused question items be separated and integrated into the exams of subject courses rather than be tested in Maritime English exams. To achieve the communication requirements stipulated by the IMO, technical English vocabularies and their usages could be taught in subject courses rather than in Maritime English courses which should focus on practicing real-life Maritime English communication. Specific, timely and constructive feedback should be provided to students to keep their motivation for learning (Narciss & Huth, 2004).

Since Chinese students have a tendency to be reliant on their teachers in the learning process (Chen et al., 2015) and tend to be inactive in the interactions (Davis et al., 2016), Maritime English teachers should design attractive online activities to enhance student engagement. Teachers can ask more questions (Inayatullah, 1999), using discussion boards and chat rooms (Reeves et al., 2002), creating online learning community (Liu et al., 2010) and engaging students through collaborative group work, peer assessment or specified feedback (Reeves et al., 2002). The use of online methods can compensate for limited class time and save more class time for hands-on communication practices (Ferreira, 2014). Special attention should be paid to those with low self-efficacy in online communication (Hung et al., 2010). However, teachers should avoid the tendency of overuse or misuse of interactions, which will lead to great confusion and failure in teaching and learning (Hirumi, 2006).

The provisions of online support for Maritime English teachers and maritime students have different focuses. Generally, Maritime English teachers need professional training for the purpose of integrating online technology tools in classroom activities. Such training should

include not only the skills required to operate the software and the learning management system but also the related instructional design skills so that the teacher can integrate online learning activities into their classroom (Wilson & Stacey, 2004). In addition, some other support, such as teaching approach and pedagogy, should be provided to help teachers adapt to the blended learning environment (Redmond, 2011). Support for students should be tailored to their individual needs and preferences. Orientation programs and easy access to support are vital in guiding students in blended learning. Other forms of online support, such as study skill assistance, ongoing program advising, education counseling, digital library, and access for students with disabilities should be considered to enhance students' online experience (Ally, 2008). Furthermore, free WiFi access and computer use on campus should be available to students and teachers.

For Maritime English teachers, they need to transform the role from an authoritative teacher towards a learning facilitator in the new learning environment. To be effective in blended learning, Maritime English teachers must have fluent English, necessary technical skills, professional knowledge, and more importantly, be effective coordinators and facilitators. Instead of imparting pre-planned knowledge, teachers should find ways to encourage, motivate and guide students in online learning activities. For instance, providing quick and supportive assistance when students face problems or feel discouraged during the process of blended learning; providing learning objectives, assessment measure and intended outcomes to students before the instruction of each unit; increasing students' engagement in the learning process; and making a pre-test or questionnaire before the course to examine the entry level and individual preferences of students. The flexibility in a blended learning environment makes it possible to be responsive to students' diverse learning needs, styles, and expectations (Mupinga et al., 2006). Considerations for individual needs should be incorporated into every aspect of blended learning, such as designing assessment and feedback, choosing learning materials and providing online support. Many online tools, for instance, internet-based self-learning programs (Youssef & Taher, 2005), a repertoire of online learning media, activities and materials (Anderson, 2008; Marsh, 2012) and video or audio lectures (Brecht, 2012), can be applied to achieve this purpose.

7.4 Limitations of the study

While this study has achieved its aim and objectives, there are several limitations in this research. One limitation lies in the scope of this study. This research focused on online

Maritime English education in China. Therefore, the results of this research cannot be generalised as a framework of online Maritime English education for other countries. Although Maritime English education shares some common features all over the world, perceptions towards effective online methods might be different due to the different cultural backgrounds and educational traditions.

Second, there was an inadequate representation of students who were studying in their fourth year or higher. In China, the majority of such students were in their final year of study. In most cases, they were busy with job hunting and graduation issues. As a result, only five of the students in this group participated in this research which may result in bias for this group. However, four Maritime English teachers who taught this group of students participated in this research. As discussed in Chapter 3, the questionnaire questions were mainly aimed to examine maritime students' experience. Normally, one Maritime English teacher teaches at least one class of maritime students. Therefore, teachers have more comprehensive views regarding the practical situation of Chinese maritime students. The participation of Maritime English teachers remedied the inadequate representation of the students of this group to some extent.

Third, since some interview participants stated that they would feel uncomfortable if their interviews were recorded, the author chose to take note of important answers and probably missed minor issues, thus affecting the integrity of the interviewed data. However, a great consensus was reached by both recorded interviews and unrecorded ones in the investigated issues, so the impact of missing information was limited in this research.

Fourth, the same survey instrument was used for maritime students and Maritime English teachers. While the questions and statements were phrased to best cater for both groups, there were inevitable differences in their perspectives when answering the survey questionnaire. In addition, due to the low response rate from Maritime English teachers, comparative analysis of quantitative results from the two groups was not performed. However, the limitations caused by using the same instrument and a lack of comparative analysis had, to some extent, been alleviated by the qualitative approach employed in this research because the qualitative data were collected and analysed from the different perspectives of the two groups.

Last but not least, this study is tailored to accommodate the time and resources. The limited period of investigation does not allow for a longitudinal study to observe the effects of the recommendations made in this research.

7.5 Future research

The research findings can be converted into an implementation guide for practitioners. Without further research in practice, it will not be possible to fulfill the goal of improving the quality of Maritime English education through online tools or methods. Based on the recommendations made for online Maritime English education in China, future research into Maritime English in China might focus on operationalising the recommended blended Maritime English learning mode through a case study between a control group and an experimental group.

The research participants in this research were limited to Maritime English teachers and students. Other interested parties such as institutional policymakers, administrators, and technical support staff may have their own opinions on online Maritime English education. One avenue for further study would be research into online Maritime English education in a specific MET institution taking into account these interested parties involved. Other possible areas for further research might focus on dealing with outstanding issues found in this research, such as enhancing online interactions in English and optimising online Maritime English tests.

7.6 Summary

Despite a low level of integration of online learning in Maritime English education in China which in most cases played a supportive or adjunct role, it is an inevitable trend that blended learning will become more important in Maritime English education in China due to the strong needs and increasing involvement of ICT in maritime industry. This final chapter has summarised the overall findings of the study in relation to its objectives and the relevant literature. The final part of this thesis is about some key issues which are highlighted in the context of blended Maritime English learning in China.

• Consideration for individual needs was highlighted in this research. This element should be incorporated into every aspect of blended learning, such as designing assessment and

feedback, choosing learning materials, performing online interactions and providing online support.

• The present Maritime English exams have become one of the main concerns for both Maritime English teachers and maritime students. The focus of Maritime English education in China should shift from merely getting a high pass rate in exams to improving practical communication.

• A range of online materials need be used for Maritime English education. Rather than the dominant text form, online materials should be more authentic, attractive and in multiple forms.

• A comprehensive view is needed in the process of designing and performing online assessment. Besides taking references of some well-developed Maritime English exams, the quality of online assessments could be improved by synchronous communication between the teachers and students. Providing constructive, specific and timely feedback is an indispensable component of good online assessment practices.

• By using more online methods, interactions should put more emphasis on engaging Chinese maritime students, cultivating their critical thinking and encouraging frank opinions. More synchronous interactions are recommended for Chinese maritime students due to the communicative needs at sea.

• Online support covers a wide range of areas. Although technical support is an important aspect, there is still more to be considered to provide a quality learning environment. In addition to technical support, teachers need guidance on their transformations in the aspects such as teaching approach and pedagogy in a blended learning situation. Students need support such as study skill assistance, education counseling and where and how to get assistance. The performances of some online facilities, including the computers and the stability of the internet, are expected to be improved.

• It poses higher requirements for Maritime English teachers to teach effectively in a blended learning environment. In addition to fluent English and professional knowledge, Maritime English teachers should have basic skills in designing and performing blended instruction, and more importantly, they should know how to motivate maritime students and coordinate appropriate online activities.

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Appendices

Appendix 1: Ethics approval letter

Social Science Ethics Officer
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Tasmania 7001 Australia
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Fax: (03) 6226 7148
Katherine.Shaw@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

UTAS

19 August 2016

Dr Frances Fan
Education
Private Bag 1307

Dear Dr Fan

Re: MINIMAL RISK ETHICS APPLICATION APPROVAL
Ethics Ref: H0015968 – An Investigation of Online Maritime English Education in China

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 18 August 2016.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics

Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au.

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Sarah Clarkson
Ethics Officer
Tasmania Social Sciences HREC

Appendix 2: Questionnaire for maritime students

Part A: Participants' background information. (Please tick the most appropriate box)

Q1. What degree or certificate are you currently studying??

☐A vocational certificate

☐An associate degree

☐A bachelor's degree

☐ Others (please specify)_____

Q2. What is your major?

☐ Navigation ☐ Marine Engineering ☐ Others (Please specify)_____

Q3. In which year are you studying at your current institution?

☐the 1st year ☐the 2nd year ☐the 3rd year

☐the 4th year ☐the 5th year or higher

Q4. Your Maritime English courses are taught mainly through _____.

☐traditional face-to-face teaching

☐online methods

Q5. Does your institution provide an online learning platform for your Maritime English learning?

☐Yes. ☐No.

Q6. How do you rate your Maritime English ability?

☐ Very poor ☐Poor ☐ Fair ☐ Good ☐Excellent

Q7. How long is your experience in using the internet?

☐0--1 year ☐1—3 years ☐3—5 years

☐5—8 years ☐More than 8 years

Q8. How many students are there in your Maritime English class?

☐ 1—20 students ☐ 21—30 students ☐ 31—40 students

☐41—50 students ☐ More than 50 students

Directions: To answer Part B to Part D, please indicate your most appropriate response by using the following criteria:

SD= Strongly Disagree
D= Disagree
N= Neutral
A= Agree
SA= Strongly Agree

Part B: Current status of online Maritime English education in China. Please choose the most appropriate response to each statement.

		SD	D	N	A	SA
B1. Current status of online assessment and feedback						
Q9.	Online assessments are used in my Maritime English courses.	☐	☐	☐	☐	☐
Q10.	Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	☐	☐	☐	☐	☐
Q11.	The current online assessments can measure my Maritime English learning from different aspects.	☐	☐	☐	☐	☐
Q12.	Feedback of assessment is provided to me via online methods.	☐	☐	☐	☐	☐
Q13.	Diverse types of online feedback are provided to me, such as in written, video or audio forms.	☐	☐	☐	☐	☐
B2. Current status of online Maritime English learning materials						
Q14.	Some online learning materials are provided in my Maritime English courses.	☐	☐	☐	☐	☐
Q15.	The provided online learning materials are appropriate to my English level.	☐	☐	☐	☐	☐
Q16.	Various forms of Maritime English learning materials are provided to me via online methods.	☐	☐	☐	☐	☐
B3. Current status of online interactions						
Q17.	I interact with Maritime English teachers online for Maritime English study.	☐	☐	☐	☐	☐
Q18.	I interact with peers online for Maritime English study.	☐	☐	☐	☐	☐
Q19.	I interact online synchronously with others for Maritime English study.	☐	☐	☐	☐	☐
Q20.	I interact online asynchronously with others for Maritime English study.	☐	☐	☐	☐	☐

Q21.	My Maritime English teacher provides guidance on my online interactions.	☐	☐	☐	☐	☐
Q22.	The online interactions conducted for Maritime English study improved my Maritime English level.	☐	☐	☐	☐	☐
B4. Technologies related to online Maritime English study						
Q23.	My institution provides online tools for my Maritime English study.	☐	☐	☐	☐	☐
Q24.	The online tools provided by my institution perform stably in the course of my Maritime English study.	☐	☐	☐	☐	☐
Q25.	I am allowed to use some online tools provided by my institution to study Maritime English.	☐	☐	☐	☐	☐
Q26.	Online tools used in my Maritime English courses enhance my motivation in learning.	☐	☐	☐	☐	☐
B5. Technical support related to online Maritime English study						
Q27.	My institution provides training on how to use online tools for my Maritime English education.	☐	☐	☐	☐	☐
Q28.	My institution provides technical support for my online Maritime English education.	☐	☐	☐	☐	☐
Q29.	Technical support is provided to me in a timely manner.	☐	☐	☐	☐	☐
Q30.	Other than the resources provided in the class, my institution provides some forms of peripheral support for my Maritime English study.	☐	☐	☐	☐	☐

Part C: Needs of online Maritime English education. Please choose the most appropriate response to each statement

		SD	D	N	A	SA
C1. Needs for online assessment and feedback						
Q31.	I need online assessments of Maritime English.	☐	☐	☐	☐	☐
Q32.	I need multiple types of online assessments for Maritime English courses.	☐	☐	☐	☐	☐
Q33.	I need online feedback for Maritime English assessments.	☐	☐	☐	☐	☐

Q34.	I need many online assessments to track Maritime English learning progress.	☐	☐	☐	☐	☐
Q35.	I need different types of online feedback to track Maritime English progress, such as written, video or audio forms.	☐	☐	☐	☐	☐
C2. Needs for online learning materials						
Q36.	I prefer online Maritime English materials to paper-based materials.	☐	☐	☐	☐	☐
Q37.	I need online Maritime English materials of different levels.	☐	☐	☐	☐	☐
Q38.	I need online Maritime English materials in multiple forms.	☐	☐	☐	☐	☐
C3. Needs for online learning interactions						
Q39.	I need to interact with teachers online for Maritime English study.	☐	☐	☐	☐	☐
Q40.	I need to interact with peers online for Maritime English study.	☐	☐	☐	☐	☐
Q41.	I need synchronous online interactions for Maritime English study.	☐	☐	☐	☐	☐
Q42.	I need asynchronous online interactions for Maritime English study.	☐	☐	☐	☐	☐
C4. Needs for technology						
Q43.	I need online platforms to support Maritime English study.	☐	☐	☐	☐	☐
Q44.	I need to use different online tools for Maritime English study.	☐	☐	☐	☐	☐
Q45.	I need online devices provided by my institution to study Maritime English.	☐	☐	☐	☐	☐
C5. Needs for relevant support						
Q46.	I need training for online Maritime English study.	☐	☐	☐	☐	☐
Q47.	I need my institution to provide relevant support on online Maritime English study.	☐	☐	☐	☐	☐
Q48.	For online Maritime English study, I need to know where and how to obtain technical support.	☐	☐	☐	☐	☐

Part D: Readiness of online Maritime English education. Please choose the most appropriate response to each statement

		SD	D	N	A	SA
D1. Self-efficacy of online Maritime English learning						
Q49.	I can adapt myself to online Maritime English learning.	☐	☐	☐	☐	☐
Q50.	I am confident in communicating Maritime English online with others.	☐	☐	☐	☐	☐
Q51.	Online learning can motivate me to study Maritime English.	☐	☐	☐	☐	☐
Q52.	I do not feel frustrated when facing technology-related obstacles.	☐	☐	☐	☐	☐
Q53.	I can seek assistance when facing online learning problems.	☐	☐	☐	☐	☐
D2. Self-management of online Maritime English learning						
Q54.	I am willing to share ideas with others online.	☐	☐	☐	☐	☐
Q55.	I am autonomous in learning.	☐	☐	☐	☐	☐
Q56.	When studying online, I am not easily distracted by other online activities.	☐	☐	☐	☐	☐
D3. Technical readiness						
Q57.	I have the necessary technical skills to support my online Maritime English study.	☐	☐	☐	☐	☐
Q58.	I am willing to enhance my participation in Maritime English study by using online tools.	☐	☐	☐	☐	☐
Q59.	When encountering technical obstacles, I can find ways to solve them.	☐	☐	☐	☐	☐
D4. Support for online Maritime English learning						
Q60.	I can understand the instructions on how to use online tools.	☐	☐	☐	☐	☐
Q61.	I can find relevant online resources to support Maritime English study.	☐	☐	☐	☐	☐
Q62.	I can spend some spare time participating in the training on online learning.	☐	☐	☐	☐	☐

E. Concluding remarks

Please feel free to write any comments or remarks you would like to make in regarding to the online Maritime English education in China.

When available, a summary of the results of this questionnaire can be provided to you upon request. Please email: Jingyi.shi@utas.edu.au, if you need the results.

This is the end of the questionnaire. Thank you very much for your time and contribution.

Appendix 3: Questionnaire for Maritime English teachers

Part A: Participants' background information. (Please tick the most appropriate box)

Q1.What degree or certificate are your students currently studying?

☐A vocational certificate

☐An associate degree

☐A bachelor's degree

☐ Others (please specify)_____

Q2. What is your students' major?

☐ Navigation ☐ Marine Engineering ☐ Others (Please specify)_____

Q3. In which year are your students studying at your current institution?

☐the 1st year ☐the 2nd year ☐the 3rd year

☐the 4th year ☐the 5th year or higher

Q4. Your Maritime English courses are taught mainly through _____.

☐traditional face-to-face teaching

☐online methods

Q5. Does your institution provide an online learning platform for your Maritime English teaching?

☐Yes. ☐No.

Q6. How would you rate your students' Maritime English ability?

☐ Very poor ☐Poor ☐ Fair ☐ Good ☐Excellent

Q7. How long is your experience in using the internet?

☐0--1 year ☐1—3 years ☐3—5 years

☐5—8 years ☐More than 8 years

Q8. How many students are there in your Maritime English class?

☐ 1—20 students ☐ 21—30 students ☐ 31—40 students

☐41—50 students ☐ More than 50 students

Directions: To answer Part B to Part D, please indicate your most appropriate response by using the following criteria:

SD= Strongly Disagree
D= Disagree
N= Neutral
A= Agree
SA= Strongly Agree

Part B: Current status of online Maritime English education. Please choose the most appropriate response to each statement.

		SD	D	N	A	SA
B1. Current status of online assessment and feedback						
Q9.	Online assessments are used in my Maritime English courses.	☐	☐	☐	☐	☐
Q10.	Varied online assessments are used in my Maritime English education, such as informal self-evaluation or formal ones.	☐	☐	☐	☐	☐
Q11.	The current online assessments can measure my students' Maritime English learning from different aspects.	☐	☐	☐	☐	☐
Q12.	Feedback of assessment is provided to my students via online methods.	☐	☐	☐	☐	☐
Q13.	Diverse types of online feedback are provided to my students, such as in written, video or audio forms.	☐	☐	☐	☐	☐
B2. Current status of online Maritime English learning materials						
Q14.	Some online learning materials are provided in my Maritime English courses.	☐	☐	☐	☐	☐
Q15.	The provided online learning materials are appropriate to my students' English level.	☐	☐	☐	☐	☐
Q16.	Various forms of Maritime English learning materials are provided to my students via online methods.	☐	☐	☐	☐	☐
B3. Current status of online learning interactions						
Q17.	I interact with my maritime students online for Maritime English study.	☐	☐	☐	☐	☐
Q18.	My students interact with peers online for Maritime English study.	☐	☐	☐	☐	☐
Q19.	My students interact online synchronously with others for Maritime English study.	☐	☐	☐	☐	☐

Q20.	My students interact online asynchronously with others for Maritime English study.	☐	☐	☐	☐	☐
Q21.	I provide guidance on my online interactions.	☐	☐	☐	☐	☐
Q22.	The online interactions conducted for Maritime English studies improved my students' Maritime English level.	☐	☐	☐	☐	☐
B4. Technologies related to online Maritime English study						
Q23.	My institution provides online tools for Maritime English education.	☐	☐	☐	☐	☐
Q24.	The online tools provided by my institution perform stably in the process of Maritime English education.	☐	☐	☐	☐	☐
Q25.	My students are allowed to use some online tools provided by my institution to study Maritime English.	☐	☐	☐	☐	☐
Q26.	Online tools used in my Maritime English courses enhance my students' motivation in learning.	☐	☐	☐	☐	☐
B5. Technical support related to online Maritime English study						
Q27.	My institution provides training on how to use online tools for my Maritime English education.	☐	☐	☐	☐	☐
Q28.	My institution provides technical support for my online Maritime English education.	☐	☐	☐	☐	☐
Q29.	Technical support is provided to me in a timely manner.	☐	☐	☐	☐	☐
Q30.	Other than the resources provided in the class, my institution provides some forms of peripheral support for my Maritime English education.	☐	☐	☐	☐	☐

Part C: Needs of online Maritime English education. Please choose the most appropriate response to each statement

		SD	D	N	A	SA
C1. Needs for online assessment and feedback						
Q31.	My students need online assessments of Maritime English.	☐	☐	☐	☐	☐
Q32.	My students need multiple types of online assessments for Maritime English courses.	☐	☐	☐	☐	☐

Q33.	My students need online feedback for Maritime English assessments.	☐	☐	☐	☐	☐
Q34.	My students need many online assessments to track Maritime English learning progress.	☐	☐	☐	☐	☐
Q35.	My students need different types of online feedback to track Maritime English progress, such as written, video or audio forms.	☐	☐	☐	☐	☐
C2. Needs for online learning materials						
Q36.	My students prefer online Maritime English materials to paper-based materials.	☐	☐	☐	☐	☐
Q37.	My students need online Maritime English materials of different levels.	☐	☐	☐	☐	☐
Q38.	My students need online Maritime English materials in multiple forms.	☐	☐	☐	☐	☐
C3. Needs for online learning interactions						
Q39.	My students need to interact with teachers online for Maritime English study.	☐	☐	☐	☐	☐
Q40.	My students need to interact with peers online for Maritime English study.	☐	☐	☐	☐	☐
Q41.	My students need synchronous online interactions for Maritime English study.	☐	☐	☐	☐	☐
Q42.	My students need asynchronous online interactions for Maritime English study.	☐	☐	☐	☐	☐
C4. Needs for technology						
Q43.	My students need online platforms to support Maritime English study.	☐	☐	☐	☐	☐
Q44.	My students need to use different online tools for Maritime English study.	☐	☐	☐	☐	☐
Q45.	My students need online devices provided by my institution to study Maritime English.	☐	☐	☐	☐	☐
C5. Needs for relevant support						
Q46.	My students need the training in online education.	☐	☐	☐	☐	☐
Q47.	My students need my institution to provide relevant support on online Maritime English study.	☐	☐	☐	☐	☐

Q48.	In the online Maritime English study, my students need to know where and how to obtain technical support.	☐	☐	☐	☐	☐

Part D: Readiness of online Maritime English education. Please choose the most appropriate response to each statement

		SD	D	N	A	SA
D1. Self-efficacy of online Maritime English learning						
Q49.	My students can adapt themselves to online Maritime English learning.	☐	☐	☐	☐	☐
Q50.	My students are confident in communicating Maritime English online with others.	☐	☐	☐	☐	☐
Q51.	Online learning can motivate my students to study Maritime English.	☐	☐	☐	☐	☐
Q52.	My students do not feel frustrated when facing technology-related obstacles.	☐	☐	☐	☐	☐
Q53.	My students can seek assistance when facing online learning problems.	☐	☐	☐	☐	☐
D2. Self-management of online Maritime English learning						
Q54.	My students are willing to share ideas with others online.	☐	☐	☐	☐	☐
Q55.	My students are autonomous in learning.	☐	☐	☐	☐	☐
Q56.	When studying online, my students are not easily distracted by other online activities.	☐	☐	☐	☐	☐
D3. Technical readiness						
Q57.	My students have the necessary technical skills to support their online Maritime English study.	☐	☐	☐	☐	☐
Q58.	My students are willing to enhance their participation in Maritime English study by using online tools.	☐	☐	☐	☐	☐
Q59.	When encountering technical obstacles, my students can find ways to solve them.	☐	☐	☐	☐	☐
D4. Support for online Maritime English learning						
Q60.	My students can understand the instructions on how to use online tools.	☐	☐	☐	☐	☐

Q61.	My students can find relevant online resources to support Maritime English study.	☐	☐	☐	☐	☐
Q62.	My students can spend some spare time participating in the training on online learning.	☐	☐	☐	☐	☐

E. Concluding remarks

Please feel free to write any comments or remarks you would like to make in regarding to the online Maritime English education in China.

When available, a summary of the results of this questionnaire can be provided to you upon request. Please email: Jingyi.shi@utas.edu.au, if you need the results.

This is the end of the questionnaire. Thank you very much for your time and contribution.

Appendix 4: Interview questions for maritime students

1. What are your opinions about current status of online Maritime English learning in China? (From the perspectives of online assessment and feedback, online learning materials, online interactions, and related online support)

2. Do you need online methods to improve your Maritime English learning? If yes, in which aspects? Why?

3. Do you think you are ready for online Maritime English learning? If yes, in which aspects? If no, why?

4 What are your suggestions for the improvement for online Maritime English education in China?

Appendix 5: Interview questions for Maritime English teachers

1. What are your opinions about current status of online Maritime English teaching in China? (From the perspectives of online assessment and feedback, online learning materials, online interactions, and related online support)

2. Do you need online methods to improve your Maritime English teaching? If yes, in which aspects? Why?

3. Do you think you are ready for online Maritime English teaching? If yes, in which aspects? If no, why?

4. What are your suggestions for the improvement for online Maritime English education in China?

Appendix 6: Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	25	68.464	41	.005	1.670
Saturated model	66	.000	0		
Independence model	11	1046.668	55	.000	19.030

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.027	.950	.919	.590
Saturated model	.000	1.000		
Independence model	.222	.400	.280	.334

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.935	.912	.973	.963	.972
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.745	.697	.725
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	27.464	8.531	54.279
Saturated model	.000	.000	.000
Independence model	991.668	890.312	1100.433

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.294	.118	.037	.233
Saturated model	.000	.000	.000	.000
Independence model	4.492	4.256	3.821	4.723

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.054	.030	.075	.372
Independence model	.278	.264	.293	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	118.464	121.179	204.847	229.847
Saturated model	132.000	139.167	360.051	426.051
Independence model	1068.668	1069.862	1106.676	1117.676